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SEPTEMBER 1981

September 1: The space shuttle Columbia returned to the firing pad Monday to start final preparations for takeoff again in six weeks.

The winged space freighter, carrying its first working payload and an untested satellite-unloading crane, rode a massive crawling machine from its assembly building to the oceanside firing site 3 1/2 miles away in less than six hours.

Never before had a spaceship returned to a launch pad for flight a second time. The Columbia, set to start flight No. 2 October 9, is designed to make the trip 100 times.

"We have reached a real milestone in the program," said NASA administrator James M. Beggs.

The shuttle, attached to a new external fuel tank and two new solid propellant-booster rockets, stood in its launch-ready position on the same mobile platform it scorched when it blasted off on its maiden flight April 12.

The whole assembly, weighing 11,918,000 pounds and standing 227 feet high, began the slow journey to the launch site at 4:45 a.m. on the back of the huge crawling machine originally built to carry Apollo moon rockets in the 1960s.

The eight-tread tractor carrying the shuttle was powered by two 2,750-horsepower diesel engines that use 150 gallons of fuel for every mile traveled.

Powerful floodlights illuminated the first part of the trip. The shuttle presented an eerie view as pre-dawn mist and diesel exhaust swirled in light beams around the black-and-white machine.

The first rays of the morning sun hit the space machine as it was well on its way down the crushed rock roadway that also served as the first leg of the Apollo moon flights.

George Page, launch director, said he expects work from now to launch day to go smoothly.

"We have a fairly high confidence of making it," Page said, referring to the new October 9 launch date. The flight was delayed nine days last week by minor problems and the desire to give the launch crew some rest over the next 39 days. (THE MIAMI HERALD, 9-1-81)

<> The congressmen, movie stars and generals who watched the first Space Shuttle launch in April from the shadow of the Vehicle Assembly Building won't get that close again.

NASA's decision to move the VIP viewing sites comes after a study that showed the potential for a mist of Shuttle rocket exhaust to spread to the sites, three miles from the launch pad.

While the mist is not toxic, it can be irritating and cause discomfort, said Dr. Albert Koller, Jr., of NASA's office of environmental management.

Koller, at a press briefing following the Space Shuttle's rollout to the launch pad Monday, said the mist was detected after the first launch.

Because there were no winds blowing in the direction of the VIP site, the cloud of hydrogen chloride, aluminum oxide and water fell in a small area near the launch pad.

But Koller said northerly winds during an autumn launch, like the second Shuttle flight scheduled October 9, could push the highly acidic debris over to the bleachers.

"It would cause some reddening of the skin and burning but no permanent damage," Koller said.

NASA announced VIPs would be located outside a four-mile radius of the launch pad. Other public viewing areas would be confined outside a four-mile radius on the NASA Causeway between Kennedy Space Center and Cape Canaveral Air Force Station.

"We're just being conservative," Koller said, adding NASA environmental specialists will continue their study of the exhaust cloud during the second Shuttle launch.

Despite the rocket exhaust debris, the Space Shuttle received high marks from environmentalists studying its effect on wildlife.

The only damage to plant life came from the exhaust debris which caused some "spotting to plants," according to the report. Koller said animal life in the area did not seem to be disturbed by the launch.

Sound levels from the launch were measured at 111 decibels at the viewing site - less than the noise experienced at a rock concert, Koller said.

According to the report, U.S. Fish and Wildlife Service personnel observed no disturbance to wildlife from the sound or force of the launch. (TODAY, 9-1-81)

September 3: The spaceship that took the hard knocks so the Space Shuttle Columbia could be launched safely into orbit faces an inglorious retirement - rusting in the sagebrush under the hot California sun.

Currently, the Shuttle Enterprise is a mechanical guinea pig for more highly sophisticated Orbiters under construction. It will never be launched and its usefulness will cease in several years.

Instead of putting the Enterprise to pasture in Califo...ia, there are those who'd like to see the prototype Shuttle retire on Brevard turf.

Imagine a full-sized spaceship open for the public to tour, complete with mock-up Spacelab and cockpit. And imagine it right in front of the Visitors Information Center at Kennedy Space Center.

Arnold Richman, chief of KSC Visitors Services, lets his imagination run a little wild when it comes to the Enterprise. When NASA finishes its testing and has used what they can for Orbiter spare parts, they can give it to us, he said.

"We in public affairs (at KSC) have asked Washington that the Enterprise be considered for display here," he said. With close to 1.5 million visitors a year expected because of the Shuttle launches, Richman said KSC is the best place to view a mockup.

Too big for indoors, the Enterprise could rest near the Visitors Information Center. With the inside fully renovated, Richman foresees the test flight Orbiter equipped withslide show facilities, life-size payloads, open for a tour through the hull.

"People have no idea how big the Shuttle is or what it's capable of doing. When it's in the Vehicle Assembly Building, Orbiter Processing Facility or on the launch pad it's not really accessible," Richman said.

Saving the Enterprise from a lonely afterlife in the California desert won't happen easily.

First, NASA will make use of the non-flying Shuttle space craft for four to five years.

On September 16 it will be moved from storage to NASA's Dryden Flight Research Center in Edwards, California. There it will undergo high temperature and stress tests so engineers can make improvements on Shuttle Orbiters now under construction.

The Enterprise also is used for Shuttle spare parts. When a forklift brushed up against the Shuttle Columbia and damaged some tiles August 10, the hole was patched with a piece of the Enterprise, said Sharon Wanglin, a spokeswoman for Dryden Center.

Wanglin said despite the rigorous testing, the Enterprise will remain intact. From there it is up to NASA to decide how to retire the craft.

Rep. Bill Nelson, D-Melbourne, said he will join the fight to bring the Enterprise to his district.

"From our standpoint, we're the only place to have it. But it's going to be a long haul getting it here," he said.

Nelson, like Richman, said one important question remains unanswered - how much the mission back to KSC will cost and who will pay. (TODAY, 9-3-81)

September 4: More than 216,600 people toured the Visitors Information Center at NASA's Kennedy Space Center in August. So far this year the center has had just over 1.5 million visitors, about 25 percent more than during the same period last year.

Of the August visitors, 173,336 took the guided bus tour of KSC to view the Orbiter Processing Facility, the Vehicle Assembly Building and Complex 39, where the Space Shuttle is refurbished, assembled and launched...Patronage of the bus tour for the month ran 24.1 percent of August 1981.

In July 237,865 people visited the center, and 190,292 took the bus tour. (KSC NEWS RELEASE No. 225-81, 9-4-81)

September 5: Federal officials have blamed Rockwell International and NASA for the deaths of two Space Shuttle workers at Kennedy Space Center March 19.

Occupational Safety and Health Administration officials also fined Rockwell, employer of the two workers, a total of $420 for failure to "prevent employees from entering the (Shuttle's) aft access compartment during the operation of gaseous nitrogen purge."

NASA was blamed for opening Pad 39A "for normal work while a purge was being conducted," but not fined because the space agency is another branch of the federal government.

"That would amount to the government paying the government," said William Demery, OSHA's Tampa-based area director. He released details about the investigation report Friday.

OSHA used a complex method to calculate Rockwell's fine, mandated by the agency's own rules, Demery said.

These included factors such as the number of employees, their proximity to and the frequency of their exposure to danger, and other stress factors, he said.

A proposed penalty of $700 was reduced by 40 percent to $420, Demery said. The agency gave Rockwell credit for its cooperation and good accident record, he said.

"The penalty is not important," Demery said. "Rockwell rewrote its procedures, and they are excellent at this stage. We feel they took immediate steps to prevent an accident of this type from happening again.

"There's no reason for OSHA to press further," he added. "They're (Rockwell) not out there trying to hurt people."

Demery acknowledged OSHA's investigation of the tragedy was completed July 10, the day citations were "hand-delivered" to Rockwell and NASA officials at KSC. But he denied agency officials had attempted to withhold information from the public.

"We don't normally inform the press when citations are delivered," he said. "Besides, NASA and Rockwell are required to post the citations where the accidents occurred." (TODAY, 9-5-81)

September 7: Seven-year development of the remote manipulator system by Spar Aerospace, Ltd., as Canada's $100 million contribution to the space shuttle program has resulted in a blending of human, computer and mechanical capabilities for operation of a complex space system.

Astronauts U.S. Air Force Col. Joe H. Engle and Navy Capt. Richard H. Truly will put the manipulator arm through a lengthly series of development exercises as a key objective of the second space shuttle mission.

Operation of the remote manipulator arm from the shuttle orbiter's aft cockpit station has required development of a highly interactive man/machine interface, which was a challenge considering the dynamics and mechanical requirements of the system. Operating the arm utilizes the same rotational and translational hand controller philosophy employed in flying the orbiter and previous spacecraft, and this AVIATION WEEK & SPACE TECHNOLOGY editor had no difficulty adapting to and operating the manipulator system in Spar's Simfac simulation facility.

U.S. astronauts have spent many hours in Simfac developing and verifying manipulator system procedures. Astronauts William B. Lenoir, Sally K. Ride, Judy A. Resnik and USAF Major John M. Fabian have formed the core of this group, with Fabian especially involved in Air Force-oriented activities with the system.

Manipulator system displays are relatively simple, and one of the more challenging aspects of operating the manipulator is learning the most effective utilization of the several control modes available to the astronaut.

Precise positioning requirements, the dynamic/mechanical aspects of the system and the unusual management arrangement between the U.S. and Canada combined to result in the manipulator system's being one of the most thoroughly tested and verified systems of the shuttle program. In spite of this, Spar management is concerned that they may not be able to meet the 100-mission operating life of each system without significant refurbishment or redesign. This is because of changes in the orbiter launch and landing loads environment as determined by Rockwell International after the manipulator had been designed and built to a lesser loads environment specification by Rockwell and the National Aeronautics and Space Administration.

"We currently have negative margins on fracture critical items, elements of the structure where if you apply the load repetitively, as through multiple launches, parts could eventually fail," Eric R. Grimshaw, operations director for Spar's Remote Manipulator Systems Division, said.

The problem is not one of flight safety but a question of manipulator system lifetime without requiring refurbishment. Grimshaw said Rockwell's pre-first flight data show the first manipulator system could be used for between only two and 10 flights without fear of disabling failure.

Considerable analysis is needed to determine the validity of the preflight stress analysis data, however, in connection with the real data provided by the first flight. Spar and Rockwell have been examining both the preflight analysis and the data from the first flight to see if, combined, they present any problems for future use.

With respect to the design specification to which the system was built, Spar believes the manipulator system hardware and software validation and test have been more stringent than for most other shuttle systems. (AVIATION WEEK & SPACE TECHNOLOGY, 9-7-81, p. 57, Vol. 115, No. 10)

<> A contract has been awarded for construction of a viewing site at the KSC Shuttle Landing Facility.

The $218,944 contract was awarded to Frank A. Kennedy, Inc., 415 Commercial Drive, Cape Canaveral, Florida. The contract is one set aside for award to a small business. (KSC NEWS RELEASE No. 226-81, 9-7-81)

<> Consider the Space Shuttle as a flying tow truck that must break free of gravity's grip and catapult cargo as heavy as 16 Cadillacs into space.

To accomplish that, there can be no room for excess baggage. A few extra pounds anywhere can be a burden.

So NASA has ordered its 4.5 million-pound space workhorse to go on a diet.

That means lighter materials in parts of the Shuttle Orbiter, less wiring and removal of the paint overcoat on the massive external fuel tank.

Shuttle contractors say the tank color will probably be the most obvious change. The once all-white Shuttle will sport a light brown fuel tank for the third launch. (TODAY, 9-7-81)

September 9: The space shuttle Columbia will be pulled from active duty next year and returned to California so workers can renovate the spaceplane, even adding a kitchen, NASA officials in Washington said Tuesday.

Under NASA's new schedule, Columbia will be temporarily retired in October 1982 after completing its fifth flight.

The space shuttle then will be transferred to Rockwell International's Palmdale plant where technicians will make $20 million worth of modifications, including replacing ejection seats for the pilot and co-pilot with permanent seats.

The world's first reusable spacecraft is not expected to be ready for flight again until June 1983.

The renovation, however, won't reduce the number of missions flown in the space shuttle program, said Col. Joaquin Saavedra, chief of mission analysis and integration for the shuttle program.

NASA plans to meet its ambitious schedule by launching the second space shuttle, Challenger, in place of Columbia. Challenger is scheduled to arrive here in June.

Original plans were to alternate Columbia and Challenger, but now Challenger will fly three missions while Columbia is out of commission, Saavedra said.

When Columbia returns to duty, the two orbiters are expected to alternate flights. (SENTINEL STAR, 9-9-81, p. 3-C)

<> Shuttle astronauts Joe Engle and Richard Truly rehearsed Tuesday for the second flight of Columbia by practicing landings on the 15,000-foot runway at Kennedy Space Center.

John Young, commander of the first Shuttle mission, went along for the morning ride to give pointers to the two space rookies who are in the final phases of preparing for the October 9 launch.

The practice touchdowns were made in a Grumman Gulfstream jet, modified by NASA to have a cockpit resembling the Shuttle's.

Meanwhile, the Shuttle launch team started a demonstration countdown in the early hours Tuesday. The test will last 33 hours and include a simulated ignition of the spacecraft's main engines.

Truly and Engle don their flight suits to spend the final two hours of the simulated countdown in the Shuttle's cockpit.

KSC spokesman Dick Young said the astronauts will enter the crew compartment of the Columbia at 10 a.m. for a simulated lift-off at noon.

"This duplicates an actual Shuttle launch," Young said. "The only difference is that the external tank isn't loaded."

"So far the test has been going very well." (TODAY, 9-9-81)

September 10: Four NASA scientists have come up with a way to launch future space shuttles horizontally from an airport runway. And they'll do it by turning the super-sophisticated orbiter into, of all things, a biplane, according to an article in the September issue of Popular Mechanics.

"Everything worked out very well" in wind-tunnel tests, says William J. Small, who with co-workers L. Robert Jackson, John P. Weidner and James A. Martin came up with the design.

The key element in the complex NASA patent is the use of two-winged turbojet boosters slung under the shuttle's delta wings. Each booster contains a pod of 8 to 10 engines, burning jet fuel to develop thrust of 100,000 pounds per engine.

After a takeoff run of at least 4,150 feet, the orbiter, essentially a biplane at takeoff, according to Small, rises off the runway and assumes a high angle of attack - something over 22 degrees.

Some five minutes later, at an altitude of about 50,000 feet, the two jets - carrying human pilots or robotic gear controlled from the ground - detach and circle back for a landing, while the shuttle's rockets take it into orbit.

Because every portion of the vehicle can be recovered, says the Popular Mechanics article, the method would cost less than a conventional vertical rocket liftoff.

It would also give the space plane the ability to leave earth from any large airport, a substantial advantage in military applications of the shuttle. (DAILY COURIER-NEWS, [of Elgin, Illinois], 9-10-81)

<> The Space Shuttle Columbia successfully "blasted off" Wednesday afternoon, after an unexplained power failure delayed the last major dress rehearsal by 3 1/2 hours.

Astronauts Dick Truly and Joe Engle, who were in the cockpit during the simulation, called the rehearsal a "definite success."

We learned an awful lot and it was a good refresher course for us," Engle said, adding that the main objective of the second Shuttle mission set for October 9 will be to expand the spaceship's payload capacities.

An unexpected power failure Tuesday night had Kennedy Space Center engineers and technicians confused.

At about 9 p.m., the Orbiter Columbia shut itself down, said KSC spokesman Rocky Raab. "It's supposed to do that when it senses something wrong."

Power was restored to the Shuttle at midnight. But what was wrong is still unknown.

"We haven't done extensive troubleshooting on the problem," Raab said. "But we will study it as long as it takes to find out what went wrong."

In addition, other less serious problems arose during the rehearsal and are not expected to affect the October launch date.

Technicians detected a console problem concerning the ground supply hydraulics controlling the pad and the Orbiter.

Raab said this problem was probably the result of inconsistent readings among instruments at the pad, the Orbiter and the firing room. He declined to elaborate.

Also, improper calculations were fed into the computer program governing the Inertial Measurement System - a massive gyro-compass that controls the movement of the Space Shuttle as it travels through space.

Fourth, there was a computer problem involving the program designed to activate the tumble valve on the external fuel tank.

The valve is supposed to open automatically shortly after the external tank drops from the Shuttle. The valve lets out pressure, causing the tank to hit the Earth's atmosphere at an angle that allows the tank to disintegrate, instead of bouncing off the atmosphere and back into space.

Fifth, the simulated external tank loading process took an hour-and-a-half longer than anticipated.

At 3:55 p.m., officials simulated launch and then went through steps for a failure of one engine.

"It's something that could happen in an actual launch, so we went through procedures for it," said KSC spokeswoman Anne Skinner.

If it had been a real mission, the launch would have been scrubbed.

"We'd feel terrible," if that happened, Truly said. "But we'd still have the Orbiter sitting there. If we had had to abort a mission later in flight, we could have come back to the runway here at the Kennedy Space Center."

No engines were fired as part of the rehearsal. However, most of the electrical equipment and computers programs were tested up to the moment of ignition.

One of the most significant parts of the rehearsal involved the Ground Launch Sequence, which is activated nine minutes before takeoff.

The computerized sequence performs - much faster than humans could - hundreds of steps just before the launch.

A separate test is scheduled for Monday during which liquid oxygen and liquid hydrogen propellants will be put inside the 154-foot-tall external fuel tank. (TODAY, 9-10-81)

September 11: Budget Director David Stockman's insistence that NASA cut $367 million from its 1982 budget is the wrong medicine for the economy, according to the economics practiced in the office of Florida Rep. Bill Nelson.

A "boll weevil" Southern conservative who has been part of the political coalition that's approved President Reagan's "economic recovery" program thus far, Nelson wrote Reagan last week to ask that he "reverse these most crippling additional cuts in the agency which helps keep America a world leader in technology and innovation."

"It is precisely the innovation and technology advancement spurred by NASA which has been responsible for the economic growth since the late 1950s," said Nelson, a Democrat who represents Brevard County. "It was this innovation which drove the economy and permitted President Kennedy to cut taxes drastically, an action Mr. Stockman has commended."

A member of the House Budget and Science and Technology committees, Nelson said he's devising strategy on how to block Stockman's suggested cuts in Round 2 of the 1982 budget battle. (TODAY, 9-11-81, p. 1A)

<> John F. Murphy, a former administrative assistant to Senator Barry Goldwater (R-Ariz.) and director of legislative affairs for the Agency for International Development since

March has been named director of legislative affairs for NASA. Murphy served as administrative assistant to Goldwater from 1974 until joining AID earlier this year.

He replaces Terence T. Finn, who has been named deputy director of government/industry affairs for the agency. Finn, a former staff member of the Senate Budget Committee, joined NASA as director of legislative affairs in September 1978. He at one time served as legislative director assistant to Senator Joseph D. Tidings (D-Md.)

Joining NASA as deputy to Murphy is Patrick A. Templeton, who has been manager of government and community relations for General Electric's Major Appliance Business Group. He has been with GE since 1965. (DEFENSE DAILY, 9-11-81, Vol. 118, No. 3)

September 14: House/Senate conferees Thursday approved a $6.187 billion FY '82 appropriation for NASA, $65 million above the $6.122 billion requested by President Reagan in his revised March budget.

The House had originally approved a $6.134 billion appropriation, with a $35 million boost in R & D to be made at NASA's discretion, while the Senate had approved a $6.214 billion appropriation, with a $90 million boost in R & D allocation to nine programs, including $45 million for Aeronautical R & T. Those programs are SEPS, Spacelab payloads, UARS experiments, materials processing, search and rescue, TU, Tech Transfer, ISPM and AR & T.

The compromise bill provides $4.973 billion for R & D - an increase of $70 million, with the money to be allocated at the discretion of NASA. The Senate agreed to go along with the "ceilings" placed on the nine programs by the House, which cannot be exceeded unless the House and Senate Appropriations Committees concur. The ceilings are the amount requested by President Reagan as follows: Space Shuttle, $2.194 billion; STS Upper Stage, $75 million; Upper Stage Operations, $40 million; Space Telescope, $120 million; Gamma Ray Observatory, $8 million; Galileo, $108 million; VOIR, $10 million; Landsat-D, $84 million and Spacelab, $111 million.

At the same time, the House dropped its recommendation that NASA reprogram funds if needed for production of a fifth Shuttle Orbiter, and agreed to the Proxmire amendment barring NASA from spending funds for the Search for Extraterrestrial Intelligence. (DEFENSE DAILY, 9-14-81, p. 31, Vol. 118, No. 4)

September 15: Kennedy Space Center officials went through final preparations today for a critical tanking test and simulated launching of the space shuttle Columbia. The shuttle is scheduled to be launched for the second time on October 9.

The tanking exercise, during which the shuttle's external tank will be filled with 143,000 gallons of liquid oxygen and 183,000 gallons of liquid hydrogen, was scheduled to begin at 2 A.M., tomorrow. NASA officials said they also planned to rehearse the final 45 minutes of countdown with a simulated launching set for 8 A.M.

After the 184-foot-tall external tank is allowed to warm up for 18 hours, preparations will begin for Wednesday's test of the newly installed pressure water system on the launching pad.

The pressure water system, which sprays water around the holes of the solid rocket boosters' exhaust, is designed to prevent a recurrence of the overpressurization shock waves that were created during the shuttle's first mission last April. (THE NEW YORK TIMES, 9-15-81)

September 16: A fuel loading test of the Space Shuttle was successfully completed by NASA at 8:02 AM EDT yesterday, clearing the way for final preparations for the October 9 launch of the Shuttle. (DEFENSE DAILY, 9-16-81, p. 42, Vol. 118, No. 6)

<> Astronauts Joe Engle and Richard Truly said Tuesday they want to fly a fully loaded space shuttle next month despite concerns that excessive blastoff pressure may ground experimental hardware already stowed for the voyage.

"It certainly would disappoint us" to leave the experiments behind, Truly said, "but we're certainly not planning on doing that. We're planning to fly them."

"The overpressure problem doesn't lend itself to a clear, analytical solution," said flight commander Engle, "but it's being attacked by NASA and we're confident the problem will be solved."

The Columbia has been packed with a 5,000-pound payload of experiments and sensitive monitoring equipment and a 50-foot mechanical arm for its second voyage, scheduled for liftoff October 9. They are scheduled to be tested during the flight.

But NASA officials said Monday the delicate equipment could be scrubbed from the mission if the pressure problem isn't corrected. (SENTINEL STAR, 9-16-81, p. 1-A)

September 17: NASA is continuing to look at ways to reduce the overpressure from the Space Shuttle launch, including the possible addition of water troughs in the Solid Rocket Booster ports. A major water deluge test of the new water vibrations suppression system built into the launch pad was scheduled yesterday. The Canadians, builders of the Remote Manipulator System, and the Office of Space & Terrestrial Applications, responsible for the OSTA-1 payload, have expressed concern that the overpressure on launch could damage the RMS or the imaging radar on the OSTA-1. NASA believes that it has solved the overpressure problem, but official clearance remains to be given. (DEFENSE DAILY, 9-17-81, p. 52, Vol. 118, No. 7)

<> NASA officials Wednesday successfully tested a crucial launch pad water-spray system designed to reduce liftoff pressures on the space shuttle Columbia and its first cargo.

As planned, the system spurted 70,000 gallons of water below the launch pad for 45 seconds, clearing probably the last major hurdle before the scheduled October 9 launch.

"On a scale of 1 to 10, I'd say this was 10," said Bill Tolson, chief of NASA's launch structures and accessories section. "Apparently, everything is clear for the launch."

NASA was considering several methods of diminishing what engineers call the "overpressurization shock wave," first discovered during the shuttle's first flight in April. Wednesday's tests involved only plumbing and the flow of water on the launch pad. The rocket boosters were not fired.

The spray system is designed to shoot 100,000 gallons of water into holes below the shuttle's twin solid rocket boosters to absorb the massive pressure of rocket firing. (SENTINEL STAR, 9-17-81)

September 18: The House Tuesday passed the FY '82 HUD-IA appropriation bill approved in conference committee including a $6.187 billion appropriation for NASA, $65 million above the Administration's request.

The bill includes a $70 million increase for NASA R & D to be sent for the Solar Electric Propulsion System, International Solar Polar Mission, Shuttle/Spacelab Payload Development, Upper Atmospheric Research Satellite Experiments, Technology Transfer, Materials Processing, Search and Rescue, Technology Utilization, Aeronautical Research & Technology, and Mid-Level Facility. Funds can be spent at the discretion of NASA, with the proviso that the funding be applied in a manner to bring about "a meaningful enhancement of each of these programs." The R & D appropriation is $4.973 billion.

The bill also includes $99.8 million for Construction of Facility, a cut of $5 million, and $1.114 billion for Research & Program Management, the amount requested.

The HUD-IA bill also includes $1.071 billion for the National Science Foundation, a $37.5 million increase over the Administration's request. (DEFENSE DAILY, 9-18-81, pp. 58 & 59, Vol. 118, No. 8)

<> The negotiations on NASA's FY '83 budget now taking place between the agency and OMB include a close look at NASA's projected manifest for the Space Shuttle, which some expect to be reduced, with a concomitant delay in some payloads, as a result of increased Space Shuttle production costs and the new round of civil budget reductions. The manifest, which

has been basically complete since June, tentatively includes 31 flights from Kennedy Space Center through FY '85. (DEFENSE DAILY, 9-18-81, p. 64, Vol. 118, No. 8)

September 21: Space shuttle system last week underwent three preflight tests as final preparations continue for the scheduled October 9 launch. Last week's milestones were:

*Test loading of the external tank with cryogenic propellants.

*System test of modifications to the mobile launch platform to deflect overpressure resulting from solid rocket motor ignition away from the shuttle.

*Recertification of the No. 2 auxiliary power unit by means of a hot firing.

No debonding of the external tank's cork insulation was seen immediately after the tank test loading was completed September 15, although there was some cracking in the sprayed-on foam insulation along an air load ramp protuberance.

The test loading was considered successful although several anomalies developed, according to Horace L. Lamberth, head of the fluid systems division in NASA's shuttle engineering directorate. Most significant was a leak in the main fuel valve to the No. 2 space shuttle main engine, which was discovered when skin sensors indicated cold temperatures. A decision was made September 16 to change this valve.

Some leaking also was found in the liquid hydrogen quick disconnect umbilical. Lamberth said the seal will be retested several more times, but that the fix can probably be accomplished by increasing helium purge pressure. Changing the seal would require considerable time, he said.

Finally, a point sensor failed in the liquid oxygen tank. This sensor tells when the tank is loaded, but there are other sensors in the tank and replacement will not be necessary.

Lamberth said the fixed service structure's beanie cap gaseous oxygen vent system worked well and ullage pressures were within the specification spread. The liquid oxygen and liquid hydrogen tanks were loaded simutaneously to flight capacity.

The water cascade/trough modification to the mobile launch platform was tested in its plumbing design September 16 coincidental with scale model tests at Marshall Space Flight Center. The Kennedy test involved a full water flow in both solid rocket booster exhaust holes and troughs in one of the holes. (AVIATION WEEK & SPACE TECHNOLOGY, 9-21-81, p. 25, Vol. 115, No. 12)

September 23: Space Shuttle Columbia's second launch may be delayed as much as a month once ground crews finish assessing damage from Tuesday morning's accidental spill of poisonous oxidizer.

George Page, Kennedy Space Center's director of launch operations, told reporters Tuesday afternoon that the launch has been delayed for at least a week past its October 9 target date.

"We've got a ways to go before we can give you an idea of the launch slip," Page said when asked how much the flight would be delayed. "I'll tell you right now, in my book we're down at least a week, maybe two weeks."

Page spoke to a press conference held at Kennedy in Florida. It was monitored here at Marshall Space Flight Center's communications office.

The spill occurred as technicians on the shuttle launch pad were loading nitrogen tetroxide, a toxic fluid, into the forward reaction control system, a module of rocket thrusters located forward of the crew compartment in Columbia's nose. The thrusters control the shuttle attitude in space.

About 12:15 a.m. CDT, technicians disconnected the filling line which then failed to close, sending up to three gallons running down the right side of the shuttle.

"Within a short time it became apparent that we had a pretty serious problem," Page said.

As technicians dried the spill, using special absorbent cloth, they could feel the heatshield tiles along Columbia's side coming loose in their hands. The tiles protect Columbia from the heat of re-entering the Earth's atmosphere.

Nitrogen tetroxide is easily stored in its pure form and does not harm metal. But it breaks down organic materials such as the synthetic rubber that bonds the tiles to Columbia's aluminum skin.

"When you get the (bonding) wet with the nitrogen tetroxide, you have no adhesive qualities at all," Page explained.

The liquid also is extremely poisonous to humans. Whenever it is handled, space workers wear outfits called SCAPE suits - self-contained atmospheric protective ensemble - that are somewhat like spacesuits. No injuries were reported.

Partly because only technicians in the bulky SCAPE suits were allowed on the launch pad for several hours, the extent of the tile damage was not immediately known. At least 67 tiles had been removed by 3:30 p.m. Another 200 or so might be damaged and could require removal, cleaning and rebonding.

The spill area is about two feet wide at its top, six feet across the bottom and 18 to 20 feet high. Technicians are trying to define its boundaries to determine the extent of repair work needed.

There is no danger to the silica heatshield tiles, Page said, although they did soak up the fluid. They can be decontaminated and rebonded. The aluminum skin should be safe unless there was a good deal of water present, he said. That would cause formation of nitric acid and could weaken the metal.

Once the extent of the spill and its damage are known, Page and other space agency managers must decide if it can be repaired on the launch pad.

The rotating gantry now around Columbia was not designed for such work, so work platforms will have to be rigged.

If any oxidizer has leaked into the forward reaction control system module, it must be removed for cleaning. That capability, too, was not designed into the gantry, so Columbia might need to be returned to its hangar.

That could delay the launch by as much as a month, according to Page.

"Right now we hope that isn't going to be the case," he said, "but we can't rule that out."

Experts from Johnson Space Center in Houston, where the orbiter is managed, and from Rockwell International in Downey, California, where it was designed and built, are to go to Kennedy to assess the damage and the repairs.

The cause of the leak remained unknown Tuesday afternoon. (HUNTSVILLE TIMES, 9-23-81, p. 8)

<> It's being billed as the Shuttle slip -- just another delay that causes Brevard County's tourist industry to waver under a mass of motel cancellations and postponements.

In anticipation of the second Shuttle mission, Titusville's 1,300 motel rooms have been booked solid for the October 9 timeframe.

But now those reservations aren't worth much.

Because of Tuesday's accident on the Shuttle pad, the blastoff has been postponed for at least one to two weeks.

The news could be worse for Brevard's tourism. If the Shuttle spectacle is delayed until late November or longer, it will come smack in the middle of an already tourist-heavy time in Florida.

In October, hotel reservations usually hit a low -- Florida-bound airplanes fly with empty seats and beaches have far less than the usual number of Northern visitors.

An October 9 launch "would have come at a blessed time because...hotels would have probably been only about 50 percent occupied," said Bill Lyerly of the Titusville Chamber of Commerce.

If the spaceship takes off during winter, hotel rooms in the Titusville area will be at an even greater premium than they were during last April's launch.

NASA officials estimate about 39,500 viewers, plus about 2,700 media representatives, will be permitted on Kennedy Space Center grounds to view the launch. And thousands are expected to crowd the beaches and highways.

When news of the delay circulates throughout the nation, Lyerly expects hoards of motel cancellations and postponements.

"We're going to have to slip and slide again. We don't know what the extent is yet of the delay, but we're used to it," Lyerly said Tuesday.

Some tourists, however, grow impatient and give up trying to fit their schedules to the shifting Shuttle mission.

One businessman from Seattle, Washington, had already canceled his motel reservations by Tuesday afternoon after hearing of the accident, said Peter Gwiazda, manager of the Best Western Executive Motel in Cocoa Beach.

"Any more (Shuttle postponements) and I'm sure eventually people just can't keep delaying their plans," Gwiazda said.

Motel officials say they will transfer reservations to a new date if a patron requests the change.

Airlines will not experience the same swarm of cancellations because flight reservations aren't as top-heavy for the October 9 period.

Most Eastern Airlines flights in and out of Melbourne and Orlando for October 8-10 are "wide open," said Ray Nau, a sales manager for the airline.

Delta Airlines also reported only "normal capacity" in bookings leaving Orlando in the days following the original expected launch date. (TODAY, 9-23-81)

<> The head of the company which built the Percheron rocket, the privately-funded launch vehicle which exploded in a static test last month, told Congress yesterday that NASA has taken the space program to a point where private industry can and will take on a series of private space projects that will accelerate U.S. space accomplishments and benefit the American society and economy.

David Hannah Jr., president of Space Services Inc. (Houston) told the House Space Subcommittee, which is holding three days of hearings on the future of the U.S. Space Program, that his company is continuing with a second Percheron rocket which it expects to launch by the end of 1982.

He reported that NASA has been extremely helpful, both officially and unofficially, in helping his company analyze the problems with the Percheron and what should be done to make it successful. Moreover, he said there are hundreds of former NASA employees who have retired from the agency and live in the Houston area, many of which are being used for advice by Space Services and whose expertise is available to other companies interested in the space business.

He told the subcommittee that he does not see the Percheron competing with the NASA Space Shuttle, but supplementing it for smaller payloads.

"I think we can work together," he said, saying the Space Services/NASA connection can be "a good marriage."

The Percheron rocket is designed to launch 300-to-500-pound payloads into low Earth orbit, and ultimately to launch 1000 pounds into geosynchronous orbit.

Hannah said the most promising potential markets for Percheron are for low Earth orbit remote sensing satellites, such as might be used by oil companies for exploration, as well as certain types of communications satellites that would operate in low Earth orbit. He added that once the capability of Percheron to place payloads in low Earth orbit at a low cost is demonstrated, the market will blossom.

He said he believes that the Percheron's services could be offered at 30 to 40 percent less cost than NASA vehicles, noting that 30 percent of the NASA costs results from man-rating their vehicles. (DEFENSE DAILY, 9-23-81, p. 82, Vol. 118, No. 11)

<> John F. Kennedy Space Center Director Richard G. Smith has named a mishap investigation committee to investigate the circumstances surrounding a mishap involving a leak of nitrogen tetroxide oxidizer which resulted in damage to the Space Shuttle Orbiter. The mishap took place on September 22, 1981, at Pad A of Launch Complex 39.

The committee was charged with the responsibility to investigate the facts, determine the probable cause of the mishap, assess the possibility of recurrences of similar mishaps and recommend corrective or remedial actions.

The members of the committee are as follows:

Mr. Wiley E. Williams (KSC) - Chairman; Mr. Russell E. Rhodes (KSC); Mr. Haggai Cohen (NASA HQ); Mr. Chester A. Vaughan (JSC); Mr. Charles W. Murphy (Rockwell International) Contractor Advisor; Mr. James A. Thoma. (KSC) - NASA Advisor; Mr. James B. Lansing (KSC) - Executive Secretary.

Formation of such a committee is an established procedure following an incident involving damage to a flight vehicle. Some of the first actions of the committee were to obtain all records and documentation pertaining to the incident for study and to ask that fueling or defueling operations of the Space Shuttle involving hypergolic propellants be suspended.

The committee expects to release an interim report of findings by October 6, and a final report should be presented by October 13, 1981. (KSC RELEASE NO. 262-81, 9-23-81)

<> Kennedy Space Center engineers are seriously considering towing the damaged Space Shuttle Columbia from the launch pad to its hangar in the wake of a propellant spill Tuesday that contaminated one of the spaceship's forward steering engines.

If that happens, the October 9 launch could be delayed a month or more.

A 20-foot-long swath of the Columbia's heat protection tiles also were soaked by the acidlike nitrogen tetroxide, and by 3 p.m. Wednesday 266 tiles were removed from the Orbiter nose.

If repairs to the Shuttle can be made on the pad, engineers predict a week to two-week launch delay. But if the fully assembled spaceship has to be dismantled, the launch could be postponed more than a month.

The decision to tow the Shuttle back to the Vehicle Assembly Building and then the Columbia to the Orbiter hangar for repairs won't be made until Friday, Page said.

But schedules and the procedures for rolling the Shuttle back to its hangar started Wednesday in case officials decide repairs are too big for the pad.

NASA engineers speculate a repair job in the Orbiter hangar would be necessary if the Shuttle workers found extensive damage to the steering engines (Reaction Control System) at the Columbia's nose.

"It would take serious damage (to the Reaction Control System mechanism) to move it back," said John Presnell, who represents Johnson Space Center's Orbiter Project Office at KSC. (TODAY, 9-24-81)

<> Lt. Gen. Thomas P. Stafford (USAF-Ret.), former head of R & D for the Air Force and former astronaut, said yesterday that consideration should be given to putting the Air Force in charge of operating the Space Shuttle.

Testifying before the House Space Subcommittee on the future of the U.S. space program, Stafford said that the Air Force has the skills to carry out those operations but would need a higher budget to do so. He acknowledged that there would be criticism of the Defense Department "taking over" the civilian program, but said he did not think that would be a problem.

Noting that NASA or a private or semi-private corporation might also qualify to run the Shuttle, Stafford recommended that we "re-examine the existing management of our entire space program and re-acquire the ability to complete programs rapidly. Serious considerations should be given to management arrangements which are responsive to urgent needs and provide effective and rapid action."

Stafford testified that space is "vital" to U.S. national defense and that the U.S. "must be capable of conducting effective space operations during all conditions of conflict." (DEFENSE DAILY, 9-24-81, p. 92, Vol. 118, No. 12)

September 25: Like a fiery bullet blazing through the twilight sky, a sophisticated communications satellite was launched into space on a two-stage Delta rocket Thursday at Cape Canaveral Air Force Station.

Aside from a minute leak of fuel from the rocket, the 7:09 p.m. launch was flawless, said NASA engineers.

The fuel seepage - about five drops a minute - was not a hazard to the launch of the second Satellite Business Systems satellite which left the pad 15 minutes later than scheduled.

The Payload Assist Module, a motor designed to put the satellite in a temporary orbit around the Earth, also fired without problem.

"It came through with flying colors," said Albert Smith, an engineer with Satellite Business Systems.

Engineers had postponed the satellite launch, originally scheduled for September 3, after the Payload Assist Module failed in test firings.

Repair of the solid-fuel motor proceeded faster than anticipated and the launch was pushed forward from October 4 to Thursday.

On Saturday, the satellite will be transferred into its permanent orbit 22,240 miles above the Earth.

It will travel at 6,876 miles an hour in an orbit synchronous with the Earth's. This keeps the satellite over a particular area of the United States.

From there the satellite will serve about 25 corporate customers with high-speed communications relays across the country.

Aside from teletype printing, the satellite can relay voice and visual images from one plant to another.

"This second satellite will mean a whole lot more business. It will double our capacity," Smith said.

The first of the SBS satellites was launched in November and the third should be launched aboard the Shuttle in 1982.

Smith estimated the cost of the mission is about $37 million, plus development costs for the satellite which was built by Hughes Aircraft Co. in California. (TODAY, 9-25-81)

September 26: Officials at the Kennedy Space Center in Florida announced yesterday that repairs needed on the space shuttle Columbia because of a propellant spill Tuesday would be done at the launching pad and that the craft could be ready for flight by late October or early November.

If it had been decided to roll the shuttle back to its hangar, the delay would have been even longer beyond the original October 9 launching date.

Project engineers determined that about 340 heat-resistant tiles came loose when the spilled nitrogen tetroxide destroyed the adhesive that bonds them to the shuttle's aluminum hull. All the affected tiles were situated near the shuttle's nose and, the engineers said, were easily accessible to technicians working on platforms erected around the vehicle. The platforms were being enclosed so that temperatures and humidity could be controlled in the re-application of the tiles.

A spokesman for the Rockwell International Corporation, the prime shuttle contractor, said that the work of cleaning, regluing and retesting the tiles would begin early next week and continue around the clock. The lightweight silica tiles themselves were not damaged, only the bonding material. Nearly all of the Columbia's exterior is covered with the tiles, about 31,000 of them, which protect the vehicle from the frictional heat of re-entry into the earth's atmosphere. (THE NEW YORK TIMES, 9-26-81)

September 28: The 12 percent across-the-board cut in civil outlays in FY '82 to be requested by President Reagan in his March budget request is not expected to be applied to the $2.2 billion Space Shuttle development and production program, which the Administration protected in its earlier revisions, DEFENSE DAILY has been told. Details of the proposed civil cuts are expected to be released early this week. Currently listed exemptions include entitlement programs and Veterans Administration hospital care.

The President in March requested $5.895 billion in outlays for NASA in FY '82; a 12 percent cut from that would total $706 million. A full exemption of the Shuttle would leave NASA facing a $445 million cut. (DEFENSE DAILY, 9-28-81, p. 112, Vol. 118, No. 14)

<> Work crews put the final touches Sunday on the platforms, electrical outlets and duct work needed to repair the fuel-damaged tiles of the space shuttle Columbia before its second launch.

Space agency officials said replacement of 338 of the shuttle's 31,000 heat-resistant silica tiles will not begin until Tuesday.

The tile replacement begins a week after the accident in which nitrogen tetroxide spilled while filling fuel tanks for the shuttle's 14 small rocket thrusters that allow it to maneuver in space.

No new launch date has been set to replace the scheduled October 9 launch, but guesses by space agency officials are late October or early November. (SENTINEL STAR, 9-28-81)

September 28-30: Senator Proxmire (D-WI), in offering an amendment to increase the public debt to only $995 billion thereby avoiding the trillion dollar figure, discussed in an all-night talkathon various ways the Federal Government could save money, one of which was the elimination of a fourth Shuttle Orbiter. (NASA OFFICE OF LEGISLATIVE AFFAIRS, LEGISLATIVE ACTIVITIES REPORT, 9-28/30-81, p.1)

September 30: One painstaking step is being taken at a time as the Space Shuttle's protective eggshell of heat protection tiles is being washed, baked, examined and reexamined by a team of specially trained technicians.

The scene is a modest, gray, aluminum-sliding workshop in the shadow of the Kennedy Space Center's massive Vehicle Assembly Building.

As many as 60 men and women are giving 352 lightweight tiles some very personal care after they were soaked during a leak of a highly corrosive propellant last week.

The nitrogen tetroxide that spilled down the side of the Columbia didn't damage the tiles themselves, but it ate away at the glue that keeps them bonded to the spaceship.

Although only three tiles were glued back on to the Orbiter and 10 were awaiting reattachment Tuesday, 349 tiles had already gone through the first of at least seven steps before they are finally bonded to the aluminum skin of the Columbia.

And 131 of the brittle ceramic-like tiles were already at the end of the line -- outfitted with a felt backing called a Strain Isolation Pad.

As each tile was carefully removed from the Columbia in the days following the propellant leak, they were brought to the Rockwell International workshop where they were examined, labeled and stored.

Each of the Columbia's almost 32,000 tiles are numbered and have their individual place on the ship. When it comes to putting them back on, tiles are called by number, said Roger Loeffler, Rockwell supervisor for the preparations.

A 24-hour operation, tiles are first stripped of any remaining adhesive backing. They are washed in a de-ionized water -- a solution absent of impurities.

From there tiles are waterproffed and baked in an oven at 400 degrees for two hours.

Technicians carefully watch through the oven's glass windows as about 20 of the white-coated low temperature tiles or black-coated high temperature tiles bake.

In all, there are three different tile bakings for water-proofing and curing with temperatures as high as 1,400 degrees, Loeffler said.

The tiles, which are designed to protect the Columbia from heat as high as 2,300 degrees as it plummets through the atmosphere for landing, cannot be bonded directly to the ship's aluminum surface. They would crack as the aluminum expands and contracts.

That's where the felt Strain Isolation Pad comes in.

Technicians first spread a coating of a high-strength glue to the surface of the tile.

Using spatulas and even syringes, they tediously apply the deep red glue to the surface of the tile. Every nick and dent in the tile is covered. Then the pad is fitted over the tile's surface and clamped in place.

Later, when the tile is brought to the Orbiter, that same glue, called Room Temperature Vulcanizing adhesive, is used to hold the tile to the spaceship.

"It's similar to silicon glues, like bathtub sealant," Loeffler said of the adhesive, made by General Electric.

Loeffler said he expects to process as many as 30 or more tiles a day but added some slightly nicked tiles will take more time than others.

The tile reattachment is the only work that remains in the aftermath of the propellant spill. The cleaning of a forward steering engine compartment was finished Tuesday, said Mark Hess, space center spokesman. (TODAY, 9-30-81, p. 16A)

October 1: The lick-'em and stick-'em job of replacing heat-protection tiles on space shuttle Columbia moved slowly Wednesday following the installation of a new access platform at the launch pad.

The painstaking, round-the-clock work to reglue about 360 tiles that either fell or were removed after a fueling accident last week began Tuesday. The regluing was halted late in the day to bolt on a new platform for workers at the 193-foot level.

Technicians reported only four tiles were in place at 4 a.m. Wednesday.

The accident has delayed the October 9 launch by several weeks. A new launch date in late October or early November is to be announced soon, possibly next week, officials said. (SENTINEL STAR, 10-1-81)

<> Planning Research Corporation (PRC), of 7600 Old Springhouse Road, McLean, Virginia, has won an extension to an existing contract to provide design engineering support for the Space Shuttle program at the John F. Kennedy Space Center.

The contract renewal is for a total of $29,468,899, bringing the value of the contract to a grand total of $194,509,387 to date. The cost plus fixed fee contract is in its eighth year, and the term of the renewal extends from May 20, 1981, through May 19, 1982.

PRC provides design engineering and construction management for the Space Shuttle program, its ground support facilities and projects of the KSC Design Engineering Directorate. Some of the projects for which PRC has provided support include construction of the Vehicle Assembly Building, Launch Complex 39, the Mobile Launcher Platforms and their Crawler Transporters and various payload handling equipment at the space center. (KSC NEWS RELEASE NO. 265-81, 10-1-81)

October 2: Confident they have isolated all the contamination from last week's propellant leak, Shuttle engineers were busy replacing damaged heat protection blankets in a forward engine cavity Thursday.

Four of 26 blankets removed from the Reaction Control System were replaced. The blankets, manufactured at a Kennedy Space Center workshop, protect inner engine parts from the extreme temperature in space.

One problem technicians at the launch pad found with the malfunctioning valve at fault was a buildup of a contaminant called iron nitrate.

To prevent iron nitrate buildup again, propellants, such as nitrogen tetroxide, will be placed through a filter until they are ready to be loaded into Orbiter propellant tanks.

Reloading the highly combustible propellants into the Columbia should resume Tuesday, said Mark Hess, a space center spokesman.

Other work at the pad Thursday included installation of a camera to record the Shuttle's slight northward drift at liftoff.

Engineers want to measure the extent of the movement that is due to the asymmetry of the Orbiter, its fuel tank and solid rockets. (TODAY, 10-2-81)

October 3: An Air Force major general will assume the top position in the Space Shuttle office in November, NASA announced Friday, adding to speculation of greater military involvement in the program.

Maj. Gen. James Abrahamson has been named NASA Associate Administrator for the Office of Space Transportation Systems and is the only associate administrator tapped direct from the Air Force, said Mary Fitzpatrick, NASA spokesman in Washington, D.C.

Abrahamson, appointed by NASA Administrator James Beggs, will join four other associate administrators directing different arms of the space agency.

Rep. Bill Nelson, D-Melbourne, said the choice of Abrahamson came after "NASA surveyed a landscape of excellent managers. One at the top of their list was Gen. Abrahamson."

Commissioned an Air Force second lieutenant in 1955 and a veteran of the Vietnam War, Abrahamson has served since July 1980 at Air Force Systems Command at Andrews Air Force Base, Md.

No stranger to the space program, Abrahamson was a member of a NASA committee to assess Space Shuttle management in 1979 and was selected to be an astronaut in the Air Force's manned orbiting laboratory program from 1967 to 1969.

Nelson predicted Abrahamson's Air Force and NASA background will be an asset to the program. "The military uses of the Shuttle are an extremely important part of the national mission of the Shuttle."

Military leaders directly involved with NASA operations here predicted greater Air Force involvement in the Shuttle program by 1986 when flights from Vandenberg Air Force Base, California, are operational.

Air Force Col. Marvin Jones, commander of the Eastern Space and Missile Center at Patrick Air Force Base said Abrahamson's appointment "emphasizes the importance we in the Air Force put in Shuttle. We will be the predominant users on the West Coast. This (the Shuttle program) is where the Air Force is moving."

Five defense missions are on the Shuttle schedule for launch from Vandenberg in 1986.

Abrahamson, 48, succeeds John Yardley, who left NASA in May to become president of McDonnell Douglas Astronautics Co., a division of McDonnell Douglas Corp. (TODAY, 10-3-81)

<> Its repairs ahead of schedule, the space shuttle Columbia should be ready for a second mission by early November, launch director George Page said Friday.

Although NASA still officially is considering a launch date later this month, Page said at a news conference he was personally eliminating any chance for next shuttle ascent that soon.

"Early November looks very, very possible," he said. "The late October date looks optimistic."

Page said NASA will announce a specific date in a week. (SENTINEL STAR, 10-3-81)

October 5: President Reagan has cut the FY '82 NASA budget by $367 million to $5.755 billion, which is projected to cut outlays by $257 million to $5.638 billion. R & D has been cut by $311 million to $4.592 billion; Construction by $25 million to $80 million and RP & M by $31 million to $1.083 billion. The overall reduction is 6 percent, half of the 12 percent reduction ordered in the non-defense budget by the President, reflecting continued full funding of the Space Shuttle. The $257 million reduction in NASA's outlays represents a 4.4 percent reduction. (DEFENSE DAILY, 10-5-81, p. 150, Vol. 118, No. 19)

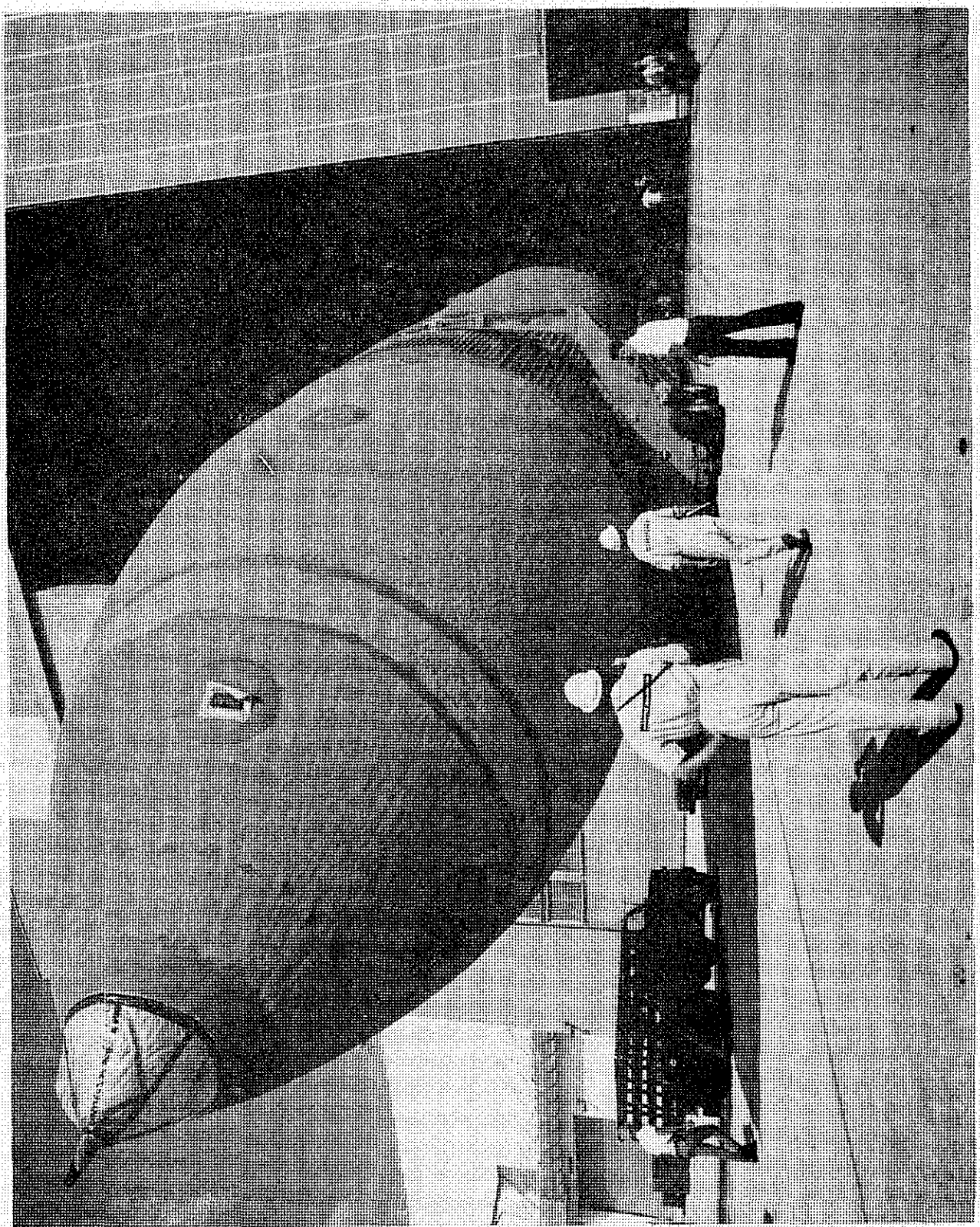
<> The pilot who first broke the sound barrier in 1947 told a crowd at the International Space Hall of Fame that the U.S. Air Force deserves the credit for his success.

"They taught me to be a fighter, test and research pilot," said Chuck Yeager, of Cedar Ridge, California. But he added that to be famous, a pilot doesn't have to be good -- only survive.

Yeager, one of seven inducted during the weekend at Alamogordo, New Mexico, said he'd "love to fly a (Space) Shuttle, but I had my fun in other aircraft."

Yeager broke the sound barrier in the Bell X-1 at more than 670 mph. He eventually achieved a speed of more than 1,000 mph and an altitude of more than 70,000 feet in the X-1.

Others inducted who were not present were astronauts Alan Shepard, who retired as a Navy rear admiral and lives in Deer Park, Texas; Scott Carpenter, who retired from the Navy



A lighter weight external tank enters the VAB on October 5, 1981, in preparation for the STS-3 mission which began at KSC on March 22, 1982.

as a commander and lives in Canoga Park, California; Gordon Cooper, who retired as an Air Force colonel and lives in Glendale, California, and Wally Schirra, who retired as a Navy captain and now lives in Inglewood, California.

Gus Grissom, America's second man into space, was inducted posthumously. (TODAY, 10-5-81, p. 12A)

October 5: International Business Machines Corporation, of 7900 Astronaut Boulevard, Cape Canaveral, Florida, has won a three year renewal of an existing contract at the John F. Kennedy Space Center.

The cost plus fee contract is for a value of $27,996,434, bringing the total value of the contract to $84,355,534 to date. Under the contract, IBM performs systems engineering and software development services in support of the Space Shuttle Launch Processing System at Kennedy Space Center and at Vandenberg Air Force Base in California.

The term of the contract extension runs from October 1, 1981 through September 30, 1984. (KSC NEWS RELEASE NO. 278-81, 10-5-81)

October 6: Space Shuttle launch director George Page, who has been called a pessimist by some, said last week that the two-week turn-around time that has been the goal for the Space Shuttle is "probably optimistic." He said there was no doubt that NASA would continue to reduce the turn-around time for the vehicle as it proceeds into the operational phase, but, "I don't think we'll ever get to two weeks." (DEFENSE DAILY, 10-6-81, p. 156, Vol. 118, No. 20)

<> Kennedy Space Center workers had three visitors Monday, but two of them -- Space Shuttle astronauts -- were kept hidden from the press.

It was the silent but impressive external fuel tank for the third Shuttle mission that space center officials revealed to photographers and reporters as it was unloaded from a covered barge.

The tank left its New Orleans, Louisiana, plant last Tuesday for the long ride to the KSC turning basin. From there it was towed to the Vehicle Assembly Building where it will be inspected and tested.

It's not that the 154-foot long tank didn't make a pretty picture. Stripped of its white insulation, the fuel tank for the third Shuttle flight is an apricot color.

That flight is now scheduled for no earlier than February.

Asthetic considerations aside, eliminating the insulation material stripped 600 pounds off the tank and added that much weight capacity to future Shuttle payloads. Engineers found the additional insulation was unnecessary.

The tank, to be filled with liquid hydrogen and liquid oxygen, will fuel the Columbia's three main engines and fall into the Indian Ocean from 73 miles up.

Meanwhile, astronauts Joe Engle and Richard Truly informally addressed launch pad crews and inspected the Orbiter between 11:45 a.m. and 3 p.m., said Dick Young, space center spokesman.

On NASA's reason for sequestering the astronauts from the press, Young explained, "They were looking for a situation where the crew could talk to the launch team without feeling they were in a goldfish bowl. They just wanted to be completely relaxed and natural."

Repairs to the Shuttle continued Monday with 241 of the Columbia's heat protection tiles reglued by the afternoon in the wake of a propellant leak last month.

Space center officials said 118 heat tile cavities remain to be filled.

Because of the propellant spill, the October launch was postponed to early November. (TODAY, 10-6-81)

October 8: The second launch of the Space Shuttle has been rescheduled for November 4, 1981.

A decision on the new launch date was made by NASA management following an assessment of work to be completed on the Orbiter Columbia.

Previously scheduled for launch on October 9, from the Kennedy Space Center, Florida, the delay was caused by a spill of oxidizer propellant on September 22, which damaged over 360 thermal protection tiles.

Replacement of the tiles is proceeding well and measures have been taken to prevent a repetition of the spill caused by the malfunctioning quick disconnect valve. (KSC RELEASE NO. 81-160, 10-8-81)

October 9: The Space Shuttle will lift off November 4 barring any problems later this month when caustic propellants are reloaded into the Columbia, NASA officials announced Thursday.

The launch that will start astronauts Joe Engle and Richard Truly on a five-day mission is scheduled for 7:30 a.m.

Officials conferring by telephone with Washington and other NASA centers -- including Kennedy Space Center -- agreed they could finish repairs to the Columbia's heat protection tiles by Sunday.

The Shuttle was previously scheduled to fly today. But a September 22 propellant leak down the side of the Columbia played havoc with the adhesive bond on 376 tiles and the October 9 date was scrubbed.

Space center engineers said Thursday the new date gives them plenty of time to trouble shoot any problems that may arise before launch. (TODAY, 10-9-81, p. 1A)

<> Prime crew astronauts Joe Engle and Dick Truly visited KSC early this week and said, "We're awfully proud of each and every one of you. From what we've heard and what we can see, you've turned around and got your spirits up and gotten your work done ahead of schedule."

The two referred to the efforts to clean up and recover after an oxidizer spill which forced the removal of hundreds of tiles and more than two dozen thermal blankets from inside the orbiter's Forward Reaction Control System.

Tile rebonding efforts early this week were running significantly ahead of schedule, with 215 tiles applied to the orbiter by Monday morning. At that time, there had been 369 tiles removed, leaving 154 cavities to be filled.

The tiles remaining, however, were expected to take somewhat longer to bond because they were in areas less accessible or were of complicated shapes and sizes. In a press briefing last week, Launch Director George Page said that he hoped to have the majority of tile rebonds finished by October 13.

"The whole world is watching us to see how we recover from this and get back in stride, and we're proud of all of you for the way it's gone," said Engle.

Truly added, "We'll be ready for the flight as soon as the vehicle is," and summarized the events of the mission plan. (SPACEPORT NEWS, 10-9-81, p. 1, Vol. 20, No. 20)

<> An atmospheric research satellite which will study the production and distribution of ozone was launched by a KSC team earlier this week from Vandenberg Air Force Base in California.

The Solar Mesosphere Explorer, or SME, lifted off at 4:27 a.m. PDT (7:27 EDT) on Tuesday. A Delta rocket carried the spacecraft into orbit.

The SME launched from California carries five scientific instruments to monitor conditions related to ozone production and distribution of the mesosphere, that region of the atmosphere located 19 to 50 miles above the Earth.

Satellites have already discovered evidence that the ozone layer, which protects us from harmful radiation, is being depleted. The SME research satellite should help us better understand the processes which create ozone and affect is distribution. (SPACEPORT NEWS, 10-9-81, p. 3, Vol. 20, No. 20)

<> There's a group of bright young scientists among the thousands of Brevard County students who returned to school this fall. They completed a summer work-study experience which would be the envy of untold numbers of young people across the country.

The ten academically talented students spent nine weeks of scientific experimentation at Kennedy Space Center as participants in the Summer High School Apprenticeship Research Program, or SHARP, for short.

The purpose of the SHARP program is to provide selected students with "first-hand" experiences in research and development environments in order that each may explore tentative career choices.

Brevard County students who participated in the SHARP program were: Brenda Anderson and Everette Jordan, Cocoa High School; Andrew Aurigema, Eau Gallie High School; Sheila Cannan and Brian O'Connell, Cocoa Beach High School; Melani Furtado, Melbourne Catholic High School and now at Brevard Community College; Lisa Guilianelli, Melbourne High School; Willie Brown and Curtis Keels, both of Titusville High School, and David Voor, Astronaut High School. (SPACEPORT NEWS, 10-9-81, p. 6, Vol. 20, No. 20)

<> Who says lightning never strikes in the same place twice?

According to KSC lightning expert Jim Stahlmann of PRC, thunderbolts have zipped the lightning mast atop Pad 39A three times, and the Pad's water tower once, since April of this year. "Studies have shown that up to 6 strikes can be expected per square kilometer per month in the summertime here at KSC," Stahlmann says.

Eventually, lightning will strike the pad while the Shuttle is there, and when it does the vehicle will be protected. Lightning usually hits the pad high point, the top of the fiberglass mast, and passes harmlessly through a cable threaded through the top of the mast to grounding points 1,000 feet away on either side.

The mast provides a "cone of protection" for the vehicle and the pad service structures.

Although the Shuttle is safely harbored while on the pad, it is susceptible to damage from strikes during its ascent to orbit. For this reason, reliable lightning warnings are necessary.

Forecasts are provided by a round-the-clock team of Air Force meteorologists at the Cape Canaveral Forecast Facility located in the Range Control Center on CCAFS.

The Shuttle will not lift off if the electric fields at the launch site exceed one kilovolt per meter or if its flight path will take it into dangerous weather. (SPACEPORT NEWS, 10-9-81, p. 7, Vol. 20, No. 20)

October 10: The delay in the launch of the space shuttle's second test mission will make it extremely difficult to make the shuttle's first operational launch in September 1982, a top NASA official said Friday.

"The slip from September 30th to October 9th to November 4th makes it extremely difficult to make launch number five in September of next year," said Michael Weeks, acting associate administrator for state transportation systems.

The shuttle's first mission, delayed two years by many problems, was launched April 12, while a propellant spill in September forced postponement of the second mission's launch.

"We've got our work cut out for us," Weeks said. "We've never had to launch an identical vehicle before, but eventually it will be easier than launching Gemini or Apollo spaceships."

Weeks was at the space center to discuss the progress of Challenger, to be delivered here June 30, 1982, and to discuss the overall space shuttle program.

Weeks said he thought the program was getting good support from the Reagan administration.

"I think Mr. Reagan is supporting the shuttle quite well in these difficult budget times," he said.

The official said he was very pleased with the progress which had been made in repairing the Columbia from the spill of the toxic fuel. He said that the November 4 launch date leaves a couple of days for problems if they occur.

As of Friday, 366 of the 377 damaged shuttle tiles had been replaced. (SENTINEL STAR, 10-10-81)

<> *Kennedy Space Center Tours had announced that records have* been broken this year for tours, running 26.5 percent ahead of last year with an attendance of more than two million.

Effective October 8 the last daily tour will leave at 4:30 p.m. (TODAY, 10-10-81)

October 12: They were the mice that roared.

Fifty self-proclaimed S.O.B.s, determined to twist the huge, powerful arm of NASA and convince anyone who would listen to "save our beach."

No one got very excited when U.S. Rep. Bill Nelson, D-Melbourne, rose at a March 1980 Titusville Chamber of Commerce breakfast to tell his listeners that NASA might close or limit access to SR 402, the only Brevard entrance to Playalinda Beach.

They needed to protect the Space Shuttle from saboteurs, Nelson explained.

But, people talked. And the more they talked, the more they questioned Nelson's warning.

By June 1980, they decided it was time for action.

It started with a meeting of 50 people, most of them Titusville business leaders.

They vowed to use bumper stickers, brochures and if it came down to it, demonstrations.

They proclaimed July 31 "Take an S.O.B. to City Hall Day."

One S.O.B. volunteered to organize a "Screech on the Beach" with his fellow S.O.B.s as the screechers and NASA as the screechees.

On "S.O.B. Day," more than 300 newly converted activists jammed Titusville city hall for a spirited meeting.

One attorney got a roaring round of applause when he told them that every law firm in North Brevard had volunteered to help in the search for legal guns to level on NASA.

The group sent a polite "thanks but no thanks" to Nelson, who had suggested a federally funded shuttle bus that would have allowed NASA to more closely monitor the beachgoers whose trip to North Brevard's only beach would bring them within three miles of the launch pad.

S.O.B. Chairman Hank Evans said a shuttle bus would be a waste of federal tax money, a nuisance to beachgoers and a program dangling at the end of a federal shoestring during hard financial times.

Private vehicular access to Playalinda was threatened when NASA officials determined they needed a 3 1/2 mile security zone around the launch site whenever a Shuttle is on the pad. They had estimated that by 1986, there might be an orbiter on the pad every day of the year.

The S.O.B.s put NASA on the hot seat, demanding to know "Why 3 1/2 miles?"

But NASA couldn't tell them. The answer was shrouded in secrecy -- "national security."

Chuck Hollingshead, public affairs director for the Kennedy Space Center, said the security report was secret because it described the Shuttle's vulnerable points and suggested ways to eliminate them.

The S.O.B.s continued to insist that NASA should worry more about the Shuttle's vulnerability from the ocean, not the beach road.

"No self-respecting saboteur would come in by land, they would come from the ocean," one S.O.B. complained.

Probably true, Hollingshead said, explaining that the security perimeter would be protection against, not professional saboteurs, but from spur-of-the-moment rifle-toting crazies.

The bitter feud went on until September 6 when KSC Director Dick Smith announced that NASA's plans to provide security for the Shuttle had been altered to allow private vehicular access. With the exception of periodic, short closures when the Shuttles are fueled, launched or landed, the beach road would stay open.

To satisfy security requirements, a checkpoint would be set up at the edge of the security zone on SR 402 and guards would randomly search vehicles heading for the beach. Roving patrols would make sure no one stopped between the checkpoint and the beach, Smith said.

Those security measures remain in force today.

George Morford, chief of launch operations and physical security at KSC, said the compromise is working.

"The public has been 100 percent cooperative. We haven't had any incidents," he said.

Searches are limited to larger vehicles, such as vans and recreational vehicles, because weapons large enough to damage the Shuttle are too conspicuous to hide in a standard passenger car, he said.

All incoming vehicles are stopped by a guard who asks if the occupants have any weapons. Some who do are allowed to continue because the weapon is too small to hit the Shuttle which sits on the pad three miles away, Morford said.

The beach snack bar and ranger station are off-limits when a shuttle is on the pad because they lie within the 3 1/2-mile security zone.

While jubilant over the compromise, the S.O.B.s say they consider the victory temporary.

A bank account, opened last year to finance the fight, remains open.

Evans said he can round up plenty of S.O.B.s at the first sign that beach access is threatened.

"I think the fact that we won the first time will cause a greater number of people to get involved next time," he said. "If anything happens, we'll be ready. We still have the bumper stickers." (TODAY, 10-12-81, p. 1B)

<> A leak of highly poisonous fumes stalled a propellant filtering operation at the Shuttle launch pad Saturday evening, Kennedy Space Center officials reported Sunday.

There were no reported injuries or any damage to the Shuttle. The launch of the second mission of the Columbia is still scheduled for November 4.

The 140 Shuttle workers evacuated from the pad were not exposed to the fumes and were able to return to work within 45 minutes of the 5:15 p.m. accident, said KSC spokesman Dick Young.

The vapors of nitrogen tetroxide escaped from a valve minutes before a filtering process was to begin at a propellant storage facility on the southeast corner of the pad.

Only a small amount of gas was vented out of the storage tank within a few seconds.

"It was a momentary thing. It just went into the air and dissipated," Young said.

Young said the venting of the vapors Saturday occurred when the propellant became overloaded in a faulty valve.

That valve was replaced Sunday and the weekend filtering of propellants for the Columbia's maneuvering engines should be completed sometime today. (TODAY, 10-12-81)

<> Rep. Bill Nelson took his message to the Reagan administration Friday, and the Melbourne congressman claims he may have changed Budget Director David Stockman's mind about NASA budget cuts.

Holding a press conference in Orlando Monday, Nelson said he met with Stockman for 15 minutes and found the president's budget director receptive to keeping space exploration probes and other non-Shuttle programs alive.

As for the Shuttle program, Nelson said the administration is still committed to funding $1 billion a year for the next three years and that any cuts to NASA's budget would neither affect the Shuttle nor the 12,000 workers at Kennedy Space Center. (TODAY, 10-13-81, p. 12A)

<> The last of 376 heat protection tiles that were removed from the Space Shuttle Columbia because of a fuel spill was reattached early Monday.

"The last tile went on at 4:15 a.m.," said Kennedy Space Center spokesman, Dick Young.

The tiles, which protect the Columbia from the firey heat of reentry into the atmosphere, came unglued from the spaceship after a caustic propellant spilled down its side during fueling September 22.

Since Friday, launch crews have been filtering propellants, trying to remove iron contaminants that damaged a valve and caused the leak. The filtering process continues today.

The only work remaining on the Columbia, scheduled for launch November 4, is minor patchwork and testing of the tiles' adhesion, Young said. (TODAY, 10-13-81, p. 12A)

October 14: Hughes Aircraft Co. has announced plans to build a new satellite assembly plant near Titusville, Florida, to build the new generation of larger satellites, which are difficult to ship across country for launching from Kennedy Space Center.

The company currently manufactures communications and weather satellites in its facotry at El Segundo, California. It said those satellites average seven feet in diameter, while the new generation of satellites are up to 14 feet in diameter.

Hughes said that the establishment of the new facility will not have a negative impact on its El Segundo operation, which currently employs 6,000 people in the design and construction of satellites.

Among the new large satellites for which Hughes is bidding, is the Intelsat VI, in competition with Ford Aerospace. (DEFENSE DAILY, 10-14-81, p. 199, Vol. 118, No. 25)

October 15: The Space Shuttle Columbia will have a dry runway for landing when it returns from orbit next month unless more rain falls on the Rogers Dry Lake bed, NASA officials said Wednesday.

Storms two weeks ago left as much as 10 inches of standing water on the lake bed, but most of it has evaporated. All that remains are two puddles beside the main runway connected by a thin stream less than an inch deep across the approach, NASA spokeswoman Sharon Wanglin said.

"The backup runway is dry today," she said Wednesday. "At this point there is not a problem. That's the situation unless we get more heavy rain."

The tentative launch date for the Columbia's second flight is November 4. (TODAY, 10-15-81)

October 18: Moving gingerly to avoid a repetition of last month's disastrous spill, technicians at the Kennedy Space Center Saturday began pumping vitriolic rocket fuel into the onboard tanks of the space shuttle Columbia.

"They're not in any hurry, nor do we want them to be," NASA spokesman Rocky Raab said.

Crews began about noon the six-day task of filling Columbia's tanks with liquid nitrogen tetroxide and hydrazine. Reporters were not on hand to witness the event and NASA's own information team was absent.

Raab said there would be "some interval" between the time the fuel flow began and the first flow into Columbia's tanks.

"It is a step-by-step process with checking all along the way," he said.

Raab said additional precautions had been taken since the September 22 spill of nitrogen tetroxide that caused 379 of Columbia's heat-shielding thermal tiles to peel off its aluminum skin. That resulted in pushing back the launch date for the shuttle's second orbital journey from October 9 to November 4.

One of the precautions was replacement of the shutoff valve that failed to halt the flow of nitrogen tetroxide, as it was designed to do. Raab said the valve was replaced "with one of similar design."

The propellant being loaded into the tanks fuels the small rocket thrusters used to maneuver the Columbia in space. When combined, hydrazine and nitrogen tetroxide are self-igniting into a hot gas, producing the needed thrust. (THE MIAMI HERALD, 10-18-81)

<> It was part of a dream come true for Robbie Zinni and his family.

The 9-year-old Texas boy with incurable leukemia was greeted by astronaut Ellison Onizuka at Kennedy Space Center Saturday morning and given a tour of the center's control room and a close look at the Space Shuttle's launch pad. (TODAY, 10-18-81, p. 1B)

October 21: Representatives of companies that might be interested in bidding on a future contract to do all shuttle processing for NASA have been invited to watch the complete cycle of preparation of the Space Transportation System for its third mission, KSC Director Richard G. Smith announced today.

Smith said that qualified companies have been invited to assign a limited number of their own managers and engineers to observe and assess the steps required from the time the orbiter returns to KSC after its second trip in space until it is returned after its third mission. The group of observers will have no active role and no official responsibility for shuttle processing operations.

The invitation is an effort to give potential bidders every opportunity to learn what it takes to prepare the shuttle for flight in order to assure knowledgeable competition when NASA solicits proposals for a Shuttle Processing Contract (SPC) next fall.

The plan evolved after recent discussions with industry representatives invited to KSC to assist in planning activities. Smith asserted that NASA is "anxious to demonstrate that a viable competition with the hardware developers is a realistic possibility." He said, "NASA is prepared to alter its traditional role of involvement in day to day shuttle operations and redirect its resources to other activities more in keeping with the NASA research and development mission."

The new contract will cover refurbishment after flights of Space Transportation System orbiters in preparation for their next missions, checkout and assembly of the other elements of the Space Shuttle such as the External Tank and Solid Rocket Boosters, and responsibility for support operations materials, including maintenance and operation of facilities.

The SPC is the second of three comprehensive contracts that NASA intends to establish at KSC as the most effective and economical method of conducting Shuttle missions when the system becomes operational subsequent to the first four developmental flights. The first contract, covering base operations, or institutional support services, is scheduled to be awarded about one year from now. The third, the Cargo Processing Contract, is not currently scheduled but is intended to follow the other two. (KSC RELEASE NO. 289-81, 10-21-81)

<> In order to reduce the excessive overpressure experienced during the maiden voyage of the Space Shuttle in April, NASA has added two water suppression systems to the mobile launch pad -- one which will spray water directly into the exhaust plume as the Solid Rocket Boosters ignite to absorb the shock wave generated, and the second, a series of water troughs that will be suspended around each booster. Approval to add the latter system was given by NASA-Headquarters about two weeks ago. Marshall Space Flight Center was assigned to come up with solutions to the overpressure problem.

During the STS-1 launch, several milliseconds after the Shuttle's Solid Rocket Boosters were ignited, a pressure "pulse" bounced back up through the holes in the Shuttle's mobile launch platform, causing excessive stress loads on the Orbiter's aft heat shield and flight control surfaces.

Concern was later expressed that the overpressure could damage the Remote Manipulator System or the imaging radar on the OSTA-1 scientific package schedule to go on STS-2. (DEFENSE DAILY, 10-21-81, p. 238, Vol. 118, No. 30)

<> NASA has announced a $28 million contract renewal to I.B.M. The contract will include the systems engineering and software development services in support of the Space Shuttle Launch Processing Systems at the Kennedy Space Center and Vandenberg Air Force Base in California. (TODAY, 10-21-81, p. 14C)

October 22: Technicians are so far ahead of schedule preparing the Space Shuttle for launch, they're all getting the day off Sunday.

Fueling the Columbia's rear and forward maneuvering engines with propellants should be completed this morning, said space center spokesman Rocky Raab.

The fuel, combined with nitrogen tetroxide, provides the combustion needed to power engines while the Columbia is in orbit.

Working about 11 hours ahead of schedule, all Shuttle launch crews at Pad 39A will get a day off Sunday so "the team can prepare themselves and be fresh for the pre-countdown activities next week," Raab said.

One of these pre-countdown activities will start Friday as liquid hydrogen and liquid oxygen are loaded into storage containers on the pad. (TODAY, 10-22-81, p. 12A)

October 23: Everyone in NASA agrees that the operational era of shuttle will be unlike any other period in the agency's history. Traditionally a research and development organization, the agency had devoted a great deal of innovative thinking to trying to determine the best way to direct an operational system such as the Space Shuttle.

One of the most difficult problems is determining whether a traditional hardware contractor would be most efficient at the operational tasks or whether a company concerned with day-to-day operations of more traditional transportation systems would provide a more economical approach.

The answer to such a question could well remain unknown if those companies were reluctant to compete for the contract because of their unfamiliarity with shuttle processing and fear that there is no way to compete equally with companies having spacecraft processing experience.

To solve this apparent conundrum, a number of qualified companies are being invited to KSC to observe the complete process of preparing the Columbia for its third flight.

Center Director Richard Smith says that the selected companies will assign a limited number of their managers and engineers to observe and assess the steps required from the time the orbiter returns to KSC after its second mission until it is launched once again.

The plan evolved after recent discussions with industry representatives invited to KSC to assist in the planning activity. Smith says, "NASA is anxious to demonstrate that a viable competition with the hardware developers is a realistic possibility. NASA is prepared to alter its traditional role of involvement in day to day shuttle

operations and redirect its resources to other activities more in keeping with the NASA research and development mission."

Smith said that NASA is convinced of the necessity to streamline STS operations and that there is significant opportunity for the government to reduce its costs.

The overall plan to streamline operations and to reduce costs is to have only three major contracts at KSC. The first covering base operations or institutional support services, is scheduled to be awarded about a year from now. The shuttle processing contract could be awarded as soon as the summer of 1983, and the third contract, for cargo processing, is not scheduled but is expected to follow the other two.

"By making the (three major) contractors as self-sufficient as possible," Smith said, "the government should be able to reduce the number of daily contacts and approvals now required in direction of the work, give the contractors more direct responsibility and incentive and hold them more strictly accountable for their performance and results. This should bring about lower costs to the government and industry payoff would be through incentive fees." (SPACEPORT NEWS, 10-23-81, pp. 1 & 7, Vol. 20, No. 21)

<> Eighteen NASA senior executives, including three from KSC, were awarded Presidential Rank Awards in a ceremony in Washington, D. C. last week. Center Director Richard Smith was named a Distinguished Senior Executive and George Page and Thomas Utsman, Director of Shuttle Operations and Director of Technical Support, respectively, were named Meritorious Senior Executives.

The awards are presented each year under the authority of the Civil Service Reform Act of 1978, on the principle that employees should be compensated based on their performance. The awards include a lump sum payment. (SPACEPORT NEWS, 10-23-81, p. 2, Vol. 20, No. 21)

<> Astronauts Joe Engle and Richard Truly have waited a long time for their chance to fly into orbit.

But they're no rookies.

Engle and Truly are among the first to fly America's new hybrid spacecraft as one of two crews which manned the Orbiter Enterprise during a 1977 series of approach and landing tests that verified its aerodynamic characteristics.

They twice brought the prototype orbiter to a gliding touchdown at Edwards Air Force Base after it was released from atop a 747 carrier aircraft high over the California desert.

Having served as the backup crew for the first orbital flight of the Space Shuttle, Engle and Truly have received extensive training for their mission.

They have "flown" sophisticated simulators mimicking all phases of a Shuttle mission and practiced runway approaches and landings in aircraft modified to perform like an orbiter.

Joe H. Engle, 49, will be the Commander aboard Columbia on its second orbital flight. Engle has already flown in space three times as test pilot of an X-15 rocketplane. He earned his astronaut wings by soaring above 50 miles, generally considered the threshold of outer space.

A colonel in the Air Force, Engle has flown over 135 types of aircraft and he makes a hobby of flying vintage World War II planes.

He joined NASA in 1966 and was backup lunar module pilot for the Apollo 14 mission.

Engle was born in Abilene, Kansas, and graduated from the University of Kansas with a Bachelor's degree in aeronautical engineering. He and his wife, Mary Catherine, have two children.

Navy Captain Richard H. Truly served as a pilot aboard the carriers Intrepid and Enterprise. He joined the USAF Manned Orbiting Laboratory Program in 1965 and transferred to NASA in 1969 when the MOL was cancelled.

Truly served on the astronaut support crews for the Skylab and Apollo-Soyuz manned flights and was a "capcom" (capsule communicator) during those missions.

He will be the Pilot aboard Columbia for STS-2.

Truly was born in Fayette, Mississippi, and graduated from Georgia Institute of Technology in 1959 with a Bachelor's degree in aeronautical engineering.

Truly and his wife, Colleen, have three children. (SPACEPORT NEWS, 10-23-81, p. 6, Vol. 20, No. 21)

<> RCA engineers are confident this one won't get away.

The communications satellite to be launched November 19 from Cape Canaveral Air Force Station will take the spot in the sky once reserved for the satellite that disappeared into space almost three years ago.

RCA's Satcom 3-R standing for replacement -- was unveiled by that company's engineers Thursday.

Standing about 9 feet high and weighing in at 2,400 pounds, the satellite will supply cable television customers with expanded service.

Customers include Home Box Office and the Christian Broadcast Network. "There is a vast demand for more channels and this satellite can provid that," said Bill Palme, RCA launch director.

The satellite has a total of 28 channels. Each channel is equipped to handle one television station.

The satellite will circle the globe from 22,300 miles in an orbit that is synchronous with the rotation of the Earth.

Palme said engineers still aren't sure what happened to Satcom 3, just minutes after a motor fired that was designed to put the satellite in permanent orbit.

He said it either slipped into space or crashed to the ocean below.

"We never did find it," Palme said.

The motor that failed in the first satellite was manufactured by Aerojet Co. and RCA purchased the important component from Thiokol Corp. for the replacement satellite.

Aerojet no longer makes that particular kind of motor, Palme said.

Satcom 3-R was built at a cost of $25 million and like the satellite that disappeared, it is insured for about $80 million. The Delta rocket that will carry the satellite into space costs another $25 million. (TODAY, 10-23-81)

October 25: It was the first reunion of America's manned space program, but the only astronaut to show up was Deke Slayton, the one who didn't get into space until 13 years later.

The other five former astronauts apparently were too busy to attend the get-together, which took place Saturday in a NASA park not far from where they launched into the hearts of America as heroes of the Mercury program.

According to Slayton, U.S. Senator John Glenn couldn't get away from Washington where he was embroiled in debate over the sale of AWACS planes to Saudi Arabia. Businessmen Alan Shepard and Walter Schirra had work to do in Houston and Denver, respectively. Gordon Cooper and Scott Carpenter were somewhere on the West Coast.

The only other Mercury astronaut, Virgil "Gus" Grissom was one of three astronauts killed in a 1967 launch pad fire.

Their absence, however, didn't spoil the party. An estimated 200 people arrived to relive the days of Redstone and Atlas rockets, the emotional launch of Shepard, the first American in space, and the ticker-tape hoopla that followed Glenn's orbits of the planet.

"In those days, everybody thought this was a once-around adventure, that we'd do it this time and that would be it," said Charlie Donlan, who was second in authority on the program.

"People didn't comprehend what it was all about," he said.

Slayton talked briefly about his own days as an astronaut before comparing today's NASA pilots with those of the early 1960s.

"When I was scrubbed from the Mercury mission it was the worst feeling in the world," he said. "Disappointed? That's putting it mildly. I didn't know that I would get back into space. Back then, nobody thought that far ahead."

Slayton, 57, is the only Mercury astronaut still working for NASA. He is manager of the Orbital Test Flight program for the space shuttle and plays a crucial role in selecting astronauts to man the space plane. At the picnic, he wore a red T-shirt that read: "Chief."

"What's different about today's space program is that we have different categories of astronauts, scientists and Ph.Ds who will handle the shuttle cargo. But there are still some great test pilots around."

Competition among astronauts to get on the shuttle is just as intense as it was throughout the Mercury, Gemini and Apollo programs, Slayton said.

"Everyone wants to fly every flight. It's like a football team. No one wants to sit on the bench."

When asked about the performance of astronauts John Young and Robert Crippen aboard the maiden shuttle voyage last April, he said: "They did a good job. That's nothing unusual. That's what we expect from all the astronauts."

Slayton also said Young, a veteran of five space flights, probably would not go into space again, although the Orlando native had expressed a desire to do so. "I'd be very surprised if John flew again," he said. "There are too many young people anxious to get up there."

As the picnic progressed, nostalgia flowed as heavily as the beer that was provided in several kegs.

"The high point of the program for me was when we lifted that Redstone off with Al Shepard," said Cal Moser, a Mercury engineer who now works for Martin Marietta on the shuttle's external tank.

"I just looked at that thing and tried to realize that there was actually a man inside that little capsule. I saw guys with tears in their eyes who I never expected to see cry."

W.J. "Kappy" Kapryan was one of the top NASA officials who questioned Shepard after his flight. "When we walked in the room and saw him sitting there everything was silent, kind of hushed. It was sort of a holy moment. Nothing will ever replace it."

In one sense, this was merely a reunion of memories. Many of the people attending the picnic have remained at the space center through all American space activity.

"We go from contractor to contractor. Our (identification) badges change, but the faces don't," Moser said. "We're space bums. We do a lot to stay in the area." (SENTINEL STAR, 10-25-81, pp. 1-B & 7-B)

October 26: Shuttle countdown working group is refining the launch countdown for the second space shuttle mission, and Clyde V. Netherton, working group chairman, said the approach for Space Transportation System 2 will continue to be one of research and development despite some procedural changes.

National Aeronautics and Space Administration closely analyzed the first shuttle countdown in preparation for the second count, Netherton said. The first count "did well but there were too many activities between T-12 and T-8 [illegible]. We need to loosen this period," he said.

"Fuel cell activation was one example. We took it out of that time slot and will start the system for STS-2 in parallel with external tank cryogenic loading. This also will reduce the fuel cell running time.

"Connecting ordnance and the range safety validation tests disrupted the countdown flow more than anything else. We should be doing this in the Vehicle Assembly Building, but we'll do it on the pad 6.5 days before launch."

Ordnance, range safety and fuel cell activities are the most significant changes between STS-1 and STS-2, Netherton said. Countdown time will remain the same, 73 hr. (AVIATION WEEK & SPACE TECHNOLOGY, 10-26-81, p. 24, Vol. 115, No. 17)

<> Loss of the actual grapple test is more of a disappointment than a significant loss of data. The grapple test was to have been the most operationally oriented element of the manipulator tests during the flight. Actual grappling will now be delayed until Mission 3, when astronauts Marine Col. Jack R. Lousma and USAF Col. Charles G. Fullerton are to use the arm to extract the induced environment contamination monitor from the payload bay.

The Mission 2 test was canceled when an end effector completing qualification tests necessary for first flight failed to successfully complete a test in which the end effector's movable carriage is pulled down to form a hard contact between the arm and its target, when an actual target is present.

In order to locate the problem, the test end effector had to be disassembled, and this in turn delayed completion of the qualification requirements necessary to clear the end effector mounted in the orbiter for actual use, Spar said. None of the other manipulator exercises planned over three days of testing in space are affected. The problem is not expected to cause any changes in plans to use the end effector operationally in the third flight, although some end effector design improvements could result. (AVIATION WEEK & SPACE TECHNOLOGY, 10-26-81, p. 24, Vol. 115, No. 17)

<> Shuffle 3,000 people -- tops in their professions -- into Kennedy Space Center, seat them as close to center stage as possible and watch their eyes pick up a permanent gleam.

Once they are showered with Shuttle dust, most guests invited to view the spectacle of a launch from an exclusive NASA grandstand become space enthusiasts for life.

And they are guests who, when impressed, make the news.

With the theory that seeing is believing, NASA officials have mailed private invitations to politicians, celebrities, educators and business and civic leaders throughout the United States.

In April the list included John Denver, Gov. Jerry Brown and Pat Boone. (TODAY, 10-26-81, p. 1A)

<> The troops will be out November 4, searching for anything suspicious in the air, land or sea.

The delicate, multibillion-dollar Space Shuttle will be protected by Kennedy Space Center security officers, the FBI, the Federal Aviation Administration, Florida Marine Patrol, Brevard County Sheriff's Department, U.S. Fish and Wildlife Service, Florida Highway Patrol, U.S. Coast Guard and auxiliary and the U.S. Air Force.

While northern Brevard County won't resemble a maximum security jail, Shuttle guards will be out in full force. The area will be the center of attention for most of the nation when the Shuttle takes to the sky for a second time. And with all that attention comes a security risk and, consequently, a need for tight protection.

More than 200 KSC security officials, plus officers from at least eight other policing agencies will ensure no authorized aircraft, boats, vehicles or pedestrians venture near the Space Shuttle, said George Morford, chief of launch operations, security branch.

They hope the launch won't be a repeat performance of April's even, when, to the surprise of onlookers, a private, unauthorized airplane buzzed by the Shuttle minutes before takeoff.

As a result, the FAA, which had only one aircraft guarding restricted airspace in April, has increased its strength to two planes for the November event, Morford said. A KSC helicopter will also circle the area.

While Secret Service officers won't be guarding the spaceship, they will be on hand if President Reagan or other top government officials fly in for the launch, he said.

The multiple agencies will communicate through use of a command center at KSC. Air to ground communications -- bogged down by some confusion last spring -- will be strengthened by use of more administrative personnel, Morford said.

Officers will patrol Playalinda Beach, which will again be closed to beachgoers three days before the launch up through launch day. Mosquito Lagoon and the Banana River will also be watched carefully for waterborne intruders.

Traffic is the most time-consuming concern of the officers. Although about 8,000 bus, trailer and car passes (excluding the media) will allow visitors onto KSC -- about 3,000 less than in April -- security officials still expect traffic backlogs.

Visitors at the space center are expected to reach 45,000 plus about 3,000 media representatives.

Cars stacked up for miles on SR 3 and U.S. 1 last April 10, which turned out to be the day the launch was scrubbed and rescheduled.

To solve that problem, security will open a third gate to check through vehicles with permits. The gate, off the NASA Causeway, is between Cape Canaveral Air Force Station and KSC.

The two KSC gates will open at midnight, two hours earlier than last time, to avoid stackups of early-arriving vehicles.

Since the launch is scheduled for 7:30 a.m. on a Wednesday, about 10,000 KSC employees will be filing to work at the same time as visitors, causing an even greater traffic jam than during the April 12 Sunday launch.

To avoid the crowds, visitors with vehicle permits are advised to arrive at KSC around midnight and no later than 4 a.m., Morford said. (TODAY, 10-26-81, p.1B)

October 27: A malady that struck Brevard County school children in epidemic proportions last April is expected to resurface next week.

The symptoms include difficulty sleeping, increasing excitement and the tendency to speak in acronyms used by aerospace engineers. Like VAB, OPF, STS-2, LCC.

The problem is Shuttle fever and school officials acknowledge there's little they can do about it.

So they'll hold school as usual November 4 -- the day the Space Shuttle Columbia is expected to begin its second mission about 7:30 a.m.

That's what school officials did on the scheduled maiden launch day April 10.

The space bug hit hard that day causing the school absentee rate to top 90 percent in some schools -- even though the launch was scrubbed.

Many elementary children went to school as usual, but the older students apparently were smacked by Shuttle fever. (TODAY, 10-27-81, p. 1B)

October 28: Citrus production -- one of Florida's oldest industries -- is stepping out of its time warp this winter with the help of NASA space technology.

After decades of old-fashioned and erratic transmission of weather predictions, some Florida citrus growers will have access to direct freeze warnings relayed by satellites.

Computers that give a colorful picture of data collected by one of NASA's satellites are being set up in five Florida counties and one Georgia county.

The computers will offer citrus growers as much as eight hours notice of an impending crop-killing frost, said Dr. J. David Martsolf of the Institute of Food and Agricultural Science of the University of Florida.

With the notice, growers can switch on their heaters and fill their wells in time to salvage some of their fruit.

About 50 agricultural agents and citrus growers gathered for a seminar at Kennedy Space Center Monday and Tuesday to learn how to operate the computers.

"Growers feel they're starving for weather information," said Fred Crosby of the National Oceanic and Atmospheric Administration at Ruskin Weather Station.

Crosby mans a central computer that is the direct link to the satellite's thousands of transmissions. From Ruskin, information is filtered immediately to Florida's five computers through telephone lines.

County extension agencies in Homestead, Fort Pierce, Bartow, Tavares and Madison will operate computers in the experimental project this winter.

Citrus growers in the counties containing those cities, plus Orange County, will be able to call their extension agents and obtain up-to-the-hour weather forecasts.

Other Florida counties, including Brevard and Indian River, are expected to participate within a few years if local and federal funds become available. (TODAY, 10-28-81, p. 1B)

October 29: The countdown for the second launch of the Space Shuttle Columbia, which is scheduled for 7:30 AM EST, Wednesday, November 4, is slated to begin at 1 AM Saturday, October 31. Space Shuttle launch director George Page said Monday that "right now it doesn't look like we're going to have any problems that are going to slow us up" in making the launch. Landing at the dry lakebed at Edwards, if all goes as planned, will be at 11:40 AM EST, Monday, November 9. The weather outlook for Cape Canaveral and Edwards remains good. (DEFENSE DAILY, 10-29-81, p. 282, Vol. 118, No. 36)

October 31: It sounds ominous: a toxic chemical mist from the Shuttle blastoff, composed of ingredients such as hydrochloric acid and aluminum oxide, drifting toward an unprotected throng of more than a thousand people.

The thought was enough for NASA to move VIPs four miles away from the second Shuttle launch, a half-mile farther back from where they watched the first launch.

NASA has even begun selling anti-mist covers to people who park their cars close to the launch site. Even though diluted, the acid in the mist still is strong enough to eat into a car's finish.

Scientists are also increasing their monitoring program of the mist as part of a program to minimize the environmental damage it could cause.

But what about reporters, who will be only 3 1/2 miles from the Shuttle pad at an unprotected spot which could be bathed with the mist from Wednesday's 7:30 a.m. scheduled launch.

"You're expendable," said NASA spokesman David Garrett. "It's just like being a war correspondent. You take your chances."

That means if the winds are blowing in the right direction following the launch, reporters may suffer from temporary red skin blotches and respiratory irritations.

Following the first Shuttle liftoff, scientists found a symptom of the acid mist -- spotted vegetation four miles north of the launch pad.

If the wind had been blowing from the east or northeast, rather than from the south, the mist would have spotted the hides of reporters, VIPs and their cars located 3 1/2 miles from the pad.

So this time the VIPs are being moved back and the reporters are being warned.

"You're here for an operational purpose," Garrett said in explaining the double standard. "The VIPs are guests we bring in. They're observers."

And should reporters or their cars be injured in the line of duty, NASA will assume no responsibility, Garrett stressed.

The new precautions aside, NASA officials say the acid mist from the first Shuttle launch was even less than the computers predicted. But even so, they are stepping up their environmental monitoring of the chemical mist to study its impact on the sensitive 240,000-acre Merritt Island National Wildlife Refuge.

NASA sent a small plane into the exhaust cloud following the first Shuttle launch to measure the cloud's diameter and dispersion time. Officials now are trying to figure out a new path for the plane's second flight.

"We're going to try to get the plane in quicker this time," said Bill Brannan, director of NASA's office of environmental management. "We're going to go through the cloud twice and under it twice."

Following the first launch, Brannan said, the plane flew at a high elevation to measure the contrail of the Shuttle. But since the contrail dissipates far above the ground and poses no environmental danger, the plane for the second launch will concentrate more on the large blastoff cloud which lingers over the ground and causes the mist, Brannan said.

Two or three more launches need to be monitored before scientists analyze long-term impacts from the toxic cloud on the wildlife refuge, Brannan said.

But for now, the only major damage scientists said occurred to the refuge from the first launch was within a few thousand feet of the launch pad where the blastoff fireball charred the surrounding area, Brannan said.

From the first launch, scientists learned that their second major environmental concern before launch -- the effect of the noise on surrounding bird populations -- was not a major problem.

"They got up, flew around, and then came back and sat down," said Paul Tost, also with the office of environmental management.

But scientists from NASA and the U.S. Fish and Wildlife Service will keep the same bird-monitoring program for the second launch, Tost said. That means four nests will be watched.

A camera will be trained on an eagle's nest five miles from the launch site, and biologists will watch a colony of wading birds seven miles from the site.

Two other bird colonies within four miles of the launch complex will be examined following blastoff.

The major difference from the first Shuttle launch in April and Wednesday's launch is that the birds were nesting in April but will be more scattered about for this launch.

"The eagles aren't on their nests," Tost said. "They are fussing around in the area, but unless one lays an egg in short order, we don't anticipate they'll be housekeeping during the launch." (TODAY, 10-31-81, p. 1A)

November 1: The Space Shuttle Columbia already may seem a bit routine to some on the Space Coast, but in Lima, Ohio, it's far away, exciting and big news.

That's what is making Jimmy Flannery a celebrity in his mid-western hometown. He's going to see the launch, compliments of President Reagan and NASA.

Jimmy, you see, is 12 years old and determined.

He wanted more than anything to see the Space Shuttle Columbia launched and made up his mind to stop at nothing to realize his dream.

After all, seeing a launch is very important when you have your heart set on being an astronaut some day.

In April, James was in South Florida with his brother and widowed mother, visiting relatives. The family drove north for the first launch attempt.

The young Shuttle fan was disappointed to learn that they'd need vehicle passes to enter the space center. He was even more disappointed when the launch was scrubbed. The family didn't return for the successful launch two days later.

To get the vehicle pass he so desperately wanted for Wednesday's planned launch, Jimmy Flannery went straight to the top -- the White House.

He wrote to the President, who forwarded his letter to NASA officials in Washington, who eventually sent Jimmy the vehicle pass.

His mother Carol, a Lima postal employee, admits that she was only humoring her space-loving son when she mailed the letter to Reagan in August.

"I figured it (the letter) would get lost in the shuffle. I didn't think he'd get any response," she said.

For weeks, Jimmy asked over and over if he'd received any mail. He finally got the long-awaited letter three weeks ago.

"I was flabbergasted and he was in seventh heaven," Mrs. Flannery said.

"I guess we should never underestimate the power of a 12-year-old," she said.

Jimmy said he simply told the president that he'd missed the first launch and that "I kind of like space."

That, according to his mother, is an understatement.

"The walls of his bedroom are covered with anything to do with the Shuttle or with space," she said. "His drawings come home from school and they're all space.

"He does eat, sleep and dream space," Mrs. Flannery said.

Jimmy's science teacher at Shawnee Middle School in Lima will attest to that.

"That (the Shuttle) is all he talks about," teacher Mike Bishop said. "If I could get him as tuned in to other things I teach, he'd be super.

"We're all excited about it," Bishop said. "The only homework he'll have is a report to the class on the Shuttle."

James is due to arrive in Titusville Tuesday with his mother and 15-year-old brother William.

There won't be any motel bills to pay at the Penny Pincher Inn where they are registered, according to Jean Miller, director of reservations and sales for the motel.

"We just felt that if the president can give him a pass, we can give them a complimentary room," Miller said. (TODAY, 11-1-81, p. 4A)

<> For every set of eyes that sees the launch of the Columbia Wednesday, there is a different view of what this mission will mean for our times.

Industry sees the Space Shuttle as another factory, some in the scientific community speak of it as an extension of Earthbound telescopes and the military is calling the Shuttle the greatest defensive weapon since chain armor.

Launch II of the Columbia won't be strictly the see-if-it-can-fly mission of Launch I. The eyes that will study this launch will take a hard look at performance.

NASA engineers who planned the five-day, four-hour and 10-minute flight of astronauts Joe Engle and Richard Truly, put the most important maneuvers and tests of Shuttle capability at the front end of the schedule.

It's on the morning of the second day in flight the crew will unfurl a 50-foot mechanical arm from the open payload bay for testing purposes.

But the test that would have given generals and college professors reason to hold their breaths, momentarily anyway, will have to wait fo the third launch, in March, because of a possible defect in bearing at the arm's fingers.

A simple grappling or holding test onto a knob inside the payload bay by this Canadian-built robot arm would have given any Shuttle user a good indication how well objects can be manipulated and moved through space.

"The arm is essentially going to be the big payoff. It's the bread and butter of the Shuttle," said Dr. Edwin Strother, Florida Institute of Technology professor of physics.

It is the arm, with a lifting potential greater than 60,000 pounds, that could loft an interplanetary probe into space.

Another satellite that the robot arm could hoist into space is the Department of Defense's inertial upper stage -- a solid rocket motor that would put military payloads into high Earth orbit.

"Utimately the successful operation of that (robot arm) system is the key," said Colonel Marvin Jones, commander of the Air Force's Eastern Space and Missile Center. (TODAY, 11-1-81, p. 1A)

November 2: The worst kept secret at Kennedy Space Center has to be the location of the third overseas emergency landing site for Flight 2 of the Space Shuttle.

One site, Air Force Col. Jim Bogart said Sunday, is the U.S. Naval Air Station at Rota, Spain. A second site, he said, is the Hickam Air Force field at Honolulu International Airport, Hawaii.

The location of the third site, Bogart told an informal gathering of reporters, is "not releasable."

But as the reporters quickly pointed out, a space agency press kit plainly states that the third site is Kadena Air Base at Okinawa, an island of Japan.

"The government of Japan agreed to provide an emergency landing area in territorial properties of Japan," Bogart said, carefully.

A slightly embarrassed Hugh Harris of NASA explained, Japan didn't want a commitment to be a planned landing spo' but it was willing to help in an emergency." (TODAY, 11-2-81, p. 10A)

<> Brisk autumn winds coming out of the south could stand in the way of the Space Shuttle Columbia's scheduled launch Wednesday morning, NASA officials said Sunday.

While U.S. Air Force weather forecasts compiled Sunday indicated winds would not be great enough to delay Columbia's second voyage into space at 7:30 a.m. Wednesday,

Kennedy Space Center engineers said they aren't writing the weather off until 45 minutes before liftoff.

That's when John Young, commander of the first Shuttle, will supply a final forecast from a Gulfstream II aircraft 38,000 feet up.

It would take 27 mile-an-hour winds from the south to stand in the way of the launch itself, said Clyde Netherton, chairman of the Shuttle countdown working group.

But Netherton said greater than 11-mile-an-hour winds across the KSC runway also would force engineers to scrub the launch because NASA wants to be well prepared for an emergency landing should the mission fail in the first four minutes after liftoff. (TODAY, 11-2-81, p. 1A)

November 3: Astronauts Joe Engle and Richard Truly arrived in Brevard County Monday "more than ready" for Wednesday's launch of Space Shuttle Columbia.

Waving and smiling to reporters at the Patrick Air Force Base landing strip after their 1 hour, 40 minute flights from Houston in T-38 NASA training jets, Truly said what space center officials were reporting throughout the day -- "the Shuttle is more than ready to go."

U.S. Air Force weather forecasters said the outlook for Wednesday's launch looks "go" too. As of Monday evening, meteorologists were forecasting scattered clouds, 11 to 12 mile-an-hour winds from the southeast and only a 10 percent chance of rain for the 7:30 a.m. liftoff.

"It does look good. Even the weather looks good," said John Young, commander of the first Shuttle flight, shortly after his arrival at the Air Force Base. (TODAY, 11-3-81, p. 1A)

<> All systems remained go yesterday for the second flight of the Space Shuttle Columbia -- which will become the first spacecraft ever to fly twice in space -- scheduled for liftoff from Cape Canaveral at 7:30 AM tomorrow.

The 73-hour countdown for the mission began as scheduled at 1 AM EST Saturday. Final countdown begins five hours prior to launch.

Piloted by astronauts Joe H. Engle and Richard H. Truly, the Space Transportation System-2 (STS-2) mission is scheduled to last five days, four hours and 10 minutes. The Shuttle flew for two days and six hours in its maiden flight April 12-14. (DEFENSE DAILY, 11-3-81, p. 16, Vol. 119, No. 2)

<> Two days before Launch II of Space Shuttle Columbia, a key NASA official had a reassuring message: Don't worry about the tiles.

"We ought to have 100 percent confidence" in the tiles, "And I do," Shuttle test manager Donald K. "Deke" Slayton said Monday.

The tiles, which provide a thermal blanket to protect Columbia from the heat of re-entry, were a major cause of concern before and during the spaceship's maiden flight last April.

Despite some broken tiles, and one missing, the blanket of 30,752 tiles did its job. Re-entry was cool and smooth.

At a pre-launch briefing Monday, Slayton was asked about the status of a repair kit that was being prepared should tiles fly off during future flights.

"I don't know if we're doing anything more about it or not," he said. "In my opinion, worrying about the tiles is kind of like worrying about the wing spar. You know you don't carry spars (a part which supports the wing) when you go flying.

"...The problems you can get into going out (of the spaceship) to try to do tile repair are astronomic, and we ought to be able to guarantee the crew they don't have to worry about that subject," he added.

"So, I would hope we're not messing around with tile repair kits. But that's just my personal opinion and not necessarily NASA's. I don't know what they're doing with the tile repair kit." (TODAY, 11-3-81, p. 5A)

<> Although fewer Shuttle watchers will jam Kennedy Space Center for Wednesday's launch than in April, law enforcement officials still are preparing for the same problems -- crowds and traffic.

But officials say they don't expect as many crowd problems because the number of visitors receiving precious passes to the space center has been cut almost in half. Only 45,000 passes will be issued this time, compared with 85,000 for Columbia's first liftoff.

But many law enforcement agencies throughout Brevard County are beefing up patrols in an effort to make all that Shuttle traffic flow a little easier before and after launch. (TODAY, 11-3-81, p. 1B)

November 4: The space shuttle spawned a new industry Tuesday: acid-rain car covers.

NASA concessionaires hawked the elastic-edged, plastic covers from the back of a beige panel truck in the press area parking lot. At $20 each, sales were slow.

"I don't know what they're for, really, I'm just selling them," said Doris Yost, a NASA gift shop employee.

The covers are supposed to protect vehicles from hydrogen chloride fallout spewed by the shuttle during launch. When the chemical residue combines with moisture in the air, it forms hydrochloric acid.

The acid is fairly weak but NASA scientists say it is potent enough to damage the finish on cars, make your eyes burn, or irritate the throat and lungs. (SENTINEL STAR, 11-4-81)

<> The Shuttle Columbia is Go. Astronauts Joe Engle and Richard Truly are Go. Kennedy Space Center launch crews are Go. But the weather can't seem to make up its mind.

A confident Columbia flight test manager Deke Slayton gave a "better than 50-50 chance" the Shuttle will thunder from its pad into space today, but he said gathering clouds and a chance of rain in this morning's forecast could threaten a punctual liftoff of the world's only reusable spacecraft.

"We don't expect a solid cloud deck. We'll be looking for holes in the clouds," said Slayton, who added the launch team would be satisfied with patches of blue and good visibility at the runway and pad.

"It could be a pilot's decision on the weather," Slayton said.

A U.S. Air Force forecast late Tuesday night indicated a 30-45 percent chance of rain in the early morning hours. "I think we're going to get some rain but I don't see it affecting the launch by 7:30," said Pat Mongillo, KSC emergency preparedness officer. (TODAY, 11-4-81, p. 1A)

<> Academy Award - winning director and popular actor Robert Redford said he came to watch the second launch of the Space Shuttle Columbia because he's interested in the marriage of the human spirit and the future of human values.

"With our advanced technology, we're to the point where we have to be impressed with what's happening," Redford said.

Redford said he is both frightened and fascinated by the possibilities the Shuttle offers.

"I'm frightened by the part that's computed, that can't be experimented," Redford said.

But, he said, he feels fortunate in coming to Kennedy Space Center and seeing for himself that which is the face of the future.

"The more you see and understand what it means...the more it means to our particular future."

Redford is interested in this second launch, he said, because of its studies of air pollution, air quality and the ocean. (TODAY, 11-4-81, p. 5A)

<> The problem-plagued Space Shuttle Columbia stood up thousands of disappointed space fans Wednesday morning after coming a suspenseful 31 seconds to liftoff. NASA won't attempt another launch for at least a week.

It was a dirty oil filter and not the weather NASA officials were worried about earlier in the week that prompted Shuttle launch director George Page to scrub the liftoff at 9:35 a.m.

Late Wednesday afternoon Mike Weeks, NASA's acting associate administrator for the Shuttle program, said the space agency would need a week to either repair or replace two of Columbia's Auxiliary Power Units.

The hydrazine-fueled units help steer the thrust of the Columbia's main engines during launch and operate the landing gear and flight control flaps on the wings.

Engineers said they believe either hydrazine or water leaked into the two power system gearboxes and mixed with a lubricant, "causing a waxy substance to form which may have clogged filters in the system," said Hugh Harris, NASA spokesman.

NASA officials said late Wednesday they are considering two options for getting the Columbia back into operation.

Engineers either will drain the lubricants from the gearboxes, flush the system and reservice it, or they'll replace the power units so the Shuttle can fly while NASA studies the faulty parts on the ground.

Weeks said NASA management teams will make that decision within a few days, after engineers can get a look at the complete auxiliary power system. (TODAY, 11-4-81, pp. 1A & 14A)

November 5: Dick Smith's mind was made up.

Smith, Kennedy Space Center director, flashed a thumbs down gesture, ending the suspense that had flickered through the glass-enclosed Launch Control Center since hours before dawn Wednesday.

"I say scrub it," he said softly.

Computers wound down, earphones were yanked off and hands reached for telephones at the space center's firing room.

What started as a flawless countdown ended with a delay of about a week, NASA officials said late Wednesday.

Wednesday was an on-again, off-again day after 7:25 a.m., only five minutes before NASA expected to launch its encore flight of the Columbia.

Before 7:25 a.m., Smith's face was marked with a confident smile as his headphones clattered with words from the Shuttle astronauts, from Houston and from the tier below full of engineers. He and other top officials sat in a locked, glass-plated room with their backs to the Shuttle and their faces to about 75 specialists hidden behind pale blue computer consoles.

The smile, and the confidence, soon faded. (TODAY, 11-5-81, p. 4A)

<> Walter Cronkite paused, sweet roll in hand, to expound his views on space transportation.

It was a little after 5:30 a.m. Wednesday, still dark, and the former anchorman was eating a catered breakfast on paper plates in the CBS press box, a large trailer at Kennedy Space Center.

The pre-launch breakfast was scheduled to start at 6 a.m. and although Cronkite would not lead CBS' coverage, aides were urging him to make-up for his spots as a special

correspondent. Except for Columbia's maiden voyage last April, he has covered every one of America's manned space voyages.

Cronkite, who turned 65 the day of the delayed launch, said he will function as the "old expert" for the Shuttle's second flight.

"I expect they're tolerating me, not exploiting me," the fatherly institution grinned.

CBS excluded Cronkite from the first launch shortly after he joined the board of directors of Pan American World Airways. Cronkite accepted the position a few days after his March retirement from the helm of The CBS Evening News -- a position he had held for 18 years.

There's "no bitterness," Cronkite said candidly. "I thought the decision was little bit harsh but I had to agree with it. It was kind of my own mistake and not anybody else's."

The revered journalist resigned from the board last month rather than restrict his reporting of the U.S. space program. (TODAY, 11-5-81, p. 5A)

<> The extended hold slapped on Columbia's launch a mere 31 seconds before liftoff sent hundreds of Shuttle watchers at Kennedy Space Center in a search for snacks and refreshments.

With word of a long delay, the 3,500 people at the VIP site headed for the food and drink stands in hopes of passing the time with some sustenance.

But they found the concession cupboards pretty bare.

Food director Bob Jennings of Canteen of Florida, the space center concessionaire, said the 1,300 sausage and biscuit sandwiches hauled in to feed the hungry crowd also were gobbled up.

Jennings also found his 2,880 Cokes in short supply. All 1,500 fruit pies were sold -- even the last broken one which went for half price at 25 cents.

Also devoured early at the site were 1,000 packages of cheese, Jennings said.

The concessions weren't the only places for lines. Long waits at the portable toilets also were common. At 8:20 a.m., 35 men and 42 women were standing in lines at the portables. (TODAY, 11-5-81, p. 4A)

November 6: Contrary to local reports, the Space Shuttle lifted from its launch pad two days ago "atop a plume of blue-white flame."

So says the launch agency -- a major Detroit newspaper!

The above quote may not be exact, but the Detroit News did have these Page One headlines Wednesday morning:

"Columbia does encore"..."A perfect launch"!

In its haste to meet a printing deadline, the newspaper somehow made the wrong choice of two stories that had been pre-written -- one for a scrub, the other for a launch.

"It didn't take long for 30,000 copies to come off the press and go out on the trucks," said a former TODAY staffer now living in Detroit. We phoned him yesterday after Southern Bell executive Lee Matteson tipped us off to what he'd just heard.

A photo of the front page of the News appeared in yesterday morning's Detroit Free Press, which headlined its own story: "The News knows it printed 30,000 wrong papers."

Some of those got into circulation. We couldn't get to talk to the News's managing editor to find out just how many.

But the News sure did try to recall the liftoff papers.

"They were trying to shoot the tires off the trucks" to get them to stop the delivery, our man said. We assume he was joking. (TODAY, 11-6-81, p. 1B)

<> With NASA still uncertain about a new liftoff date for the space shuttle, work crews built platforms in the rain Thursday and prepared to analyze oil in the crippled Columbia's auxiliary power units.

The weather remained rainy and windy here as workers were expected to sample the units to determine the degree of contamination in the lubricating oil. Clogged oil filters in two of the three units, which power Columbia's guidance system on landing, forced the cancellation of Wednesday's launch. (SENTINEL STAR, 11-6-81, p. 1A)

<> A cocoon of steel scaffolding surrounded the space shuttle Columbia as launch crews went back to work Thursday on the grounded spacecraft and Kennedy Space Center officials turned a wary weather eye on Hurricane Katrina.

Launch Director George Page said it would be at least Saturday before officials would know how long it would take to correct the oil contamination problems that halted Wednesday's scheduled launch of the reusable spacecraft.

Page said that the second flight of the Columbia would probably not be possible before next Wednesday and might be delayed until the following week if workers must replace the auxiliary power units that forced the postponement.

Severe weather could add to the delay. Page said that Hurricane Katrina's current course did not appear to pose any threat to work at Launch Pad 39A, but he said space center officials were monitoring the storm's progress. (THE MIAMI HERALD, 11-6-81, pp. 1A & 18A)

November 7: A new launch date for the second shuttle mission was expected to be announced today after NASA technicians finished an analysis of the oil in Columbia's power system.

Space agency officials hoped the shuttle could be launched as early as Wednesday morning. But liftoff of the historic encore journey could be delayed another week if they decide Columbia's power units have to be replaced instead of just cleaned.

Columbia's next successful blastoff will enter history books as the first relaunch ever of a manned orbital spacecraft.

NASA spokesman Mark Hess said officials have not decided when a new countdown would start in the event a Wednesday launch is announced nor have officials determined how many built-in holds to insert in the 36 1/2-hour countdown, he said.

The holds are used to rest the launch team for emergency decisions, like the one that canceled last Wednesday's launch with 31 seconds remaining.

Meanwhile, work crews inspected the shuttle's twin rocket boosters and fuel tank on launch pad 39A. On the fuel tank, a small amount of insulation was found to be slightly damaged due to icing, Hess said. (SENTINEL STAR, 11-7-81, p. 4-C)

November 8: Space officials Saturday rescheduled the second launch of the space shuttle Columbia for next Thursday.

The two hydraulic system engines that developed oil-pressure trouble seconds before blastoff last Wednesday will be fixed by simply draining contaminated gearbox oil, flushing the system and installing new filters.

"Getting to a Thursday launch is a very tight schedule but one which the mission management team feels can be made," the National Aeronautics and Space Administration announcement said. (THE MIAMI HERALD, 11-8-81, p. 1[illegible]

<> ..."Of course we'd like to have flown, but if we had a problem lurking in the bird...we're mighty glad that we found out and held off till we can get it fixed."
--Astronaut Joe Engle, after the delay of Space Shuttle Columbia's launch. (TODAY, 11-8-81, p. 10E)

November 9: National Aeronautics and Space Administration launch team made a last-minute effort here November 4 to override stored launch processing system computer pressure limit criteria for Columbia's fuel cell liquid oxygen system and continue the countdown.

Launch officials were uncertain immediately after being forced to scrub the launch whether to attribute an automatic countdown stop and inability to resume the launch countdown to procedural or software problems.

"I think we will find that the problem is procedural -- that we used the software in a way that was not intended," one engineer said.

One improvement in the launch control processor complex since the initial shuttle launch is the extension of memory capability from 64,000 to 256,000 words of working memory.

This had allowed the use of memory to store all operating formats at one time and call up the appropriate format as needed. (AVIATION WEEK & SPACE TECHNOLOGY, 11-9-81, p. 20, Vol. 115, No. 19)

<> Space shuttle auxiliary power units (APUs), designed as reusable elements to facilitate quick turnaround between missions, became the dominate factor in the postponement of Columbia's second launch. Two of the power units that were not test fired after the STS-1 mission developed lubrication problems.

To facilitate airline-type space operations, the shuttle's Sundstrand APUs are designed for reflight, with refueling the only major service operation between missions. Last week's experience, in which one APU that had been replaced and test fired after the first mission worked properly and the other two did not, will result in reconsideration of how reusable the APUs actually are without oil change and retest after each flight or following long intervals between firings.

The APU that functioned normally had been fired recently because it is a new unit replacing one that malfunctioned in the first flight. (AVIATION WEEK & SPACE TECHNOLOGY, 11-9-81, p. 22, Vol. 115, No. 19)

<> Even though the second Shuttle launch attempt was delayed just seconds before blastoff, astronaut Joe Engle said he is as ready as ever to command the Orbiter Columbia, now scheduled to fly Thursday morning.

"There wasn't ever anybody that wasn't mentally prepared," Engle said Sunday at his home in Houston.

Engle said he felt surprised when the launch was stopped last Wednesday just 31 seconds before liftoff but said, "I'm certainly glad that the problem was found before we were up in the air."

He also said the scrub did not affect his confidence in the Space Shuttle.

"I've never had any lack of confidence in the machine," Engle said.

Meanwhile, Columbia's launch pad was closed to all but essential workers Sunday while the three auxiliary power units that caused the delay were refueled with highly toxic hydrazine. (TODAY, 11-9-81, p. 1A)

November 10: Space officials gave the go-ahead Monday for a second, abbreviated countdown to start this morning, leading to the shuttle Columbia's curtain-call flight.

The clock is to start at 8 a.m., aiming for a 7:30 a.m. Thursday launch of the first spaceship ever to take a repeat trip in orbit.

The first count got to within 31 seconds of liftoff last Wednesday, only to be blocked by clogged filters in t[illegible] of Columbia's three auxiliary power units.

The units have been cleaned, the spacecraft checked and astronauts Joe Engle and Richard Truly are ready to try again. They will fly here today from their training base at the Johnson Space Center in Houston.

As last week, it appears the weather will be touch and go, with a storm front heading toward Cape Canaveral. Light, intermittent rain was forecast for Thursday morning.

"Right now they're saying the weather should be OK for launch," said space agency spokesman Mark Hess. "That front is expected to move through here on Wednesday and be gone by Thursday."

At the launch pad, Hess said, "everything is running along very smoothly," with pre-count preparations ahead of schedule.

Officials decided that the early portion of the original countdown would not have to be repeated, and instead of a full count with the clock ticking down from 73 hours, the truncated version starts at 35 hours. Three planned holds totalling 12 1/2 hours stretch the count over 47 1/2 hours, compared to 129 1/2 for the original. (THE MIAMI HERALD, 11-10-81)

November 11: With the timing of polished vaudeville comedians, astronauts Joe Engle and Richard Truly returned here Tuesday and quickly lightened any disappointment surrounding the postponement of last week's space shuttle launch.

"We've got to stop meeting out here like this," quipped Truly. He and Engle were greeted for the second time in eight days by a group of reporters, photographers and servicemen after arriving from Houston to prepare for Thursday's launch.

"I'm going to say it one more time -- Columbia is ready. Joe and I are ready. We're going to do it this time." Truly said.

Engle joked to cameramen spread across the airfield at Patrick Air Force Base: "This is it. If you don't get the right pictures this time, it's going to be your last chance. We really are going to go this time."

Engle was referring to last Wednesday's scheduled shuttle liftoff that was cancelled with just 31 seconds remaining in

the countdown when NASA officials discovered unusually high oil pressure in the orbiter's auxiliary power units. (SENTINEL STAR, 11-11-81, p. 1)

<> If any boater is thinking of sneaking into the prohibited waters around Kennedy Space Center for a closer look at the Space Shuttle -- forget it.

The U.S. Coast Guard will be out in full force, along with boats from the Coast Guard Auxiliary, the Marine Patrol, the U.S. Fish and Wildlife Department, and the Brevard County Sheriff's Department.

"People usually understand that (the patrol) is for their own safety," said Lt. Cmdr. Bruce Klimek, in charge of the patrol operation.

"If the Shuttle malfuctions or blows up, we don't want anyone to get hurt," he said.

Basically, the prohibited area includes the east half of the Indian River, the south end of the Mosquito Lagoon, the north end of the Banana River and within three miles offshore between the Mosquito Lagoon to Port Canaveral.

The area is divided into four patrolled sectors: the offshore area, Mosquito Lagoon and Haulover Canal, the Indian River, and the Banana River, Klimek said.

Each sector has at least one Coast Guard boat and three to five auxiliary boats, all staffed by at least three people, he said.

Klimek said a total of 150 Coast Guard people are involved in the operation. (TODAY, 11-11-81, p. 1B)

November 12: After more than 24 hours of holding their breath, Shuttle engineers won a battle against the clock at 12:45 a.m. today and gave a 'Go' for the launch of Columbia no sooner than 10 this morning.

Late Wednesday, the engineers successfully replaced a downed data receiving box near the crew compartment, thanks to the still unbuilt -- and now little lighter -- Shuttle Orbiter Challenger.

Two of the 36-pound black boxes were flown to Kennedy Space Center at 9:05 Wednesday night from Palmdale, California, where they had been installed in Columbia's successor and sister Shuttle. The boxes were soon installed and working aboard the Columbia.

NASA engineers had their fingers crossed Wednesday night that the space Shuttle Orbiter parts would be the eleventh-hour fix needed to launch the Shuttle late this morning.

Delayed at least 90 minutes from its original 7:30 a.m. launch time, the Columbia's return to Earth orbit depends on whether a suitcase-sized piece of data-receiving equipment works, which was salvaged from the Shuttle Orbiter Challenger.

Earlier Wednesday, engineers found one of seven data-receiving boxes, located near the crew compartment, would not perform backup operations.

The boxes, called multiplexer-demultiplexer units, receive as many as 2,800 different measurements and readings from sensors scattered throughout the Columbia. The boxes translate critical information on the Columbia's health while in space into computer language.

From there the thousands of bits of information are fed to two larger data processing units that organize and relay it to engineers on Earth.

The end result is a neat reading on a computer terminal screen at Houston's Johnson Space Center of things like the status of the Columbia's electrical power cells or temperatures inside the craft.

Although the Columbia could fly without backup systems, NASA wants a fail-safe operation so engineers on the ground won't be in danger of losing valuable information about the spacecraft as it circles the globe 150 miles up.

"The primary system is doing fine. It's a question of tidying up the backup," said L. Michael Weeks, NASA's acting associate administrator for the Shuttle program. (TODAY, 11-12-81, p. 1A)

<> Whether unsure because of last week's launch scrub or bored with it all, many visitors who normally would be jockeying for the best Space Shuttle viewing spots appeared to be staying away Wednesday.

Law enforcement officers spent the day waiting for the traffic crunch that never developed.

Their first brushes with Shuttle-watching mobs in April, when upwards of 750,000 people turned out to watch Columbia's debut, taught them to prepare for a massive onslaught of tourists and residents alike.

Although no one seems to believe the crowd for Columbia's return to space can top the first launch's turnout, officials don't agree on how close the crowd will come to last week's aborted launch, when the crowd was estimated at 300,000-plus. (TODAY, 11-12-81, p. 1A)

<> They could be called Space Age Butlers.

They primp and tuck, dress and undress their "masters," slip on shoes, smooth wrinkles and even stash a sandwich in a spare pocket.

But spacesuit technicians responsible for dressing NASA astronauts prior to a launch do more than give their models the newest high-tech fashions. Overlooking one detail could endanger the astronauts' lives.

Two gold-colored ejection escape suits have been laid out in waiting for Joe Engle and Richard Truly, who will arrive in the suiting-up room of the Operations and Control Building at Kennedy Space Center about 6:30 a.m. today.

A team of suit technicians, including Al Rochford and Jean Alexander, has arrived at KSC from Houston, where it tended to the Engle-Truly team's needs during training.

The suits, with an outer layer of fire-resistent material and an inner layer of netting and rubber, already have been tested and re-tested for dangerous leaks of oxygen.

Engle and Truly will slip into a dressing room where they'll don insulating long underwear. They will then emerge to the spotless but unsterilized "clean room," where they will sit in recliner chairs to change into their 45-pound spacesuits.

Rochford and Alexander, clad in white uniforms and caps to keep the area cleansed, will help Engle and Truly into their awkward garb. Comfort and convenience for the two astronauts are key factors.

"They can do it by themselves," Alexander said, "but it's easier for them with someone helping."

Each astronaut has his personal quirks, which the technicians know and even exploit for the sake of a joke to break the technically overwhelming aura of the hours before launch.

With Engle and Truly, the source of contention was eyeglasses. After days of preparations, technicians couldn't seem to find the right pairs to fit the astronauts. The elasticized bands holding the bifocals were either too loose or too tight, frustrating suit technicians until the glasses sat perfectly on the astronauts' noses.

It became a standard joke with the Shuttle flying duo and the technicians, even on launch day last week. As Engle and Truly readied for their trip to the pad, a suit technician paraded in front of them wearing a floppy overcoat and a pair of huge, plastic, carnival-like sun glasses. He opened the coat to reveal dozens of eyeglasses, offering the astronauts one more chance to buy the pair of their choice.

Forty-four-year-old Rochford, who has suited up astronauts since 1960, enjoys the friendly banter he has exchanged with the astronauts, including Wally Schirra in the Gemini days and Alan Shepard in Apollo 14.

Rochford has helped the flying crews through years of training and donning off-the-shelf spacesuits up to the point where he drops them off in a van at the launch pad before takeoff.

"You have to develop a rapport with the crew. You have to build up a confidence level," he said.

While Rochford remembers the experimental bygone days of spacesuits with clumsy zippers, Alexander can relate only to the Shuttle days.

Alexander applied for the suit technician job 1 1/2 years ago after working as a NASA secretary. The 36-year-old woman is the only female in the space agency's suit-up team.

"They wanted a woman to make the women astronauts more comfortable," she said.

Alexander said her talents were minimal when she was selected -- she had some mechanical ability, which means only that she knew how to turn a wrench and screwdriver. But after more than a year of on-the-job training in Houston, she is ready for her first manned launch today.

Most of the technical aspect of the suiting-up process was completed about 72 hours in advance, when the suits were hooked up to consoles which checked for air and oxygen leaks.

The suits' multiple pockets were filled with a pen and pencil, a flashlight, eyeglasses, a calculator, head set, air sickness bag, knife and even a frozen sandwich to ease hunger if a delay comes up in the launch countdown.

Emergency survival kits were double-checked by technicians and stowed inside the Shuttle Orbiter. And helmets were tested to ensure the astronauts could properly communicate with ground control.

"We just make sure everything is where it's supposed to be," Alexander said. "We're troubleshooters."

The technician team then took off early Wednesday afternoon to rest before returning to prep the suiting room several hours before launch.

Few problems come up at launch time, Rochford said. The only delay in the first launch occurred when a leak was discovered in Young's helmet. The defective helmet was replaced with a stand-by model.

After helping Engle and Truly dress today, Rochford, Alexander and one other co-worker will keep the astronauts from overheating in the heavy suits as they are driven from the Operations and Control Building to the launch pad.

The crew has 40 minutes to tend to Engle and Truly before they must be completely suited up and ready to depart for their spacecraft.

Booties will be slipped over shoes worn by Engle and Truly to ensure no dirt is trailed into the Orbiter. Their helmets and gloves will be brought to them as they are strapped into their ejection seats.

Alexander will stay in the Operations and Control Building while Rochford accompanies the astronauts to the pad. On arrival, Rochford will hand over spare ventilators and other equipment to suit technician Ron Woods, stationed at the launch pad.

And that -- the suit technicians hope -- will be the last they'll see of Engle and Truly before the two become space-tested veterans returning to share their memories. (TODAY, 11-12-81, p. 3A)

November 13: When a long-awaited goal finally looms in sight, it often loses its allure on arrival, winding up as a white-washed, anti-climactic dud.

But the Columbia, although a patience-tester, was definitely no dud Thursday morning.

The spaceship gave a repeat performance that rivaled its debut, stunning first-time viewers and renewing inspiration in veteran space watchers.

Pessimism and anxious glances at the sky disappeared, replaced with weak-kneed leaps of excitement, raised fists urging the gleaming white ship forward and shrill hoots and whistles of widespread well-wishing.

"Oh, my God. It's like an earthquake," said Kitty Carpenter, 25, of Seattle, as the hefty Columbia's liftoff made the ground tremble along the Indian River.

The Shuttle raised itself up (with the help of NASA officials) on its spiral of smoke and brilliant orange flames, seeming to pose dramatically in midair for the hundreds of media cameras aimed in its direction.

It then coyly disappeared into a thin stream of clouds, reappearing moments later to draw further applause from its audience below. Then it was gone. Seconds later, NASA spokesman Hugh Harris announced it was already approaching Spain.

Thursday's spectacle was the shortest show on Earth -- or above Earth -- but none of the gathered onlookers seemed to leave disappointed.

"The thrill of it going up -- even if it was such a short time -- will last forever," said Scott Bachman, 21, a University of Florida senior, as he watched along the Indian River in Titusville. (TODAY, 11-13-81, p. 4A)

<> An off-shore wind protected Shuttle viewers from a cloud of acid fallout left behind when Columbia blasted off launch pad 39A on Thursday, a space agency spokesman said.

When the Shuttle was scheduled to fly last week, NASA set up car washes and sold plastic car covers to protect automobiles from a possible cloud of contaminants consisting of aluminum with hydrochloric acid attached.

VIPs were moved an extra half mile from the launch site because of the potential acid mist, but the press was left only 3 1/2 miles from the launch site to watch at their own risk.

But this time, said Don Zylstra, favorable winds eliminated the pollution problem "unless you were out there in a fishing boat."

He said: "A north wind carried it (pollutants) away from the launch pad and press viewing sites."

If the winds had been from the east, however, the press may not have been so fortunate. Neither would their cars, as hardly any vehicles in the press parking lot were covered.

But one CBS camera crew came prepared with large plastic trash bags. "You know all those car covers," a cameraman said, "I brought body covers." (TODAY, 11-13-81, p. 3A)

<> ...A faulty fuel cell forced Mission Control on Thursday to consider bringing Columbia astronauts Joe Engle and Richard Truly home on Saturday, instead of the planned return next Tuesday.

Columbia does not face an emergency situation as the two previous U.S. crews did. The ship has two healthy fuel cells, but mission rules dictate that with one fuel cell out Engle and Truly do as many high priority assignments as possible in 54 hours.

NASA said it is possible the mission could go the full five days if the other fuel cells stay healthy. (TODAY, 11-13-81, p. 3A)

<> Columbia's two spent solid rocket boosters splashed down in the Atlantic Ocean about seven minutes after Thursday's launch, but rough seas delayed their recovery by NASA ships.

The 93-ton reusable rocket boosters were bobbing in 12-to-15 foot seas. The ocean was too choppy for divers to go into the water to attach an air hose, called a barb, to fill the boosters with air so they could be towed back to Port Canaveral, said a spokeswoman for the manufacturer, United Technologies.

The boosters will be refurbished and refilled for use on a future Shuttle flight. The Orbiter Columbia -- the part of the Shuttle that resembles an airplane -- also is reusable, but the spaceship's dominating external fuel tank is not. The tank broke up in the atmosphere and pieces fell into the Indian Ocean.

Radios aboard the boosters helped two NASA vessels find the boosters floating about 158 miles from Kennedy Space Center within an hour after they dropped from the Shuttle, said Sue Butler of United Technologies.

The boosters burned for 2 1/2 minutes before separating from the Columbia on takeoff. As they separated, six parachutes opened to control their descent back to Earth.

Fifty workers aboard the Liberty and Freedom retrieved the parachutes, and planned to hook up the boosters at daybreak today and tow them to Port Canaveral. (TODAY, 11-13-81, p. 3A)

<> One last time, nine minutes before liftoff, launch director George Page held the countdown clock. "Let's take our time and do it right," he told his crew. They did, and blastoff was brilliant.

The delays, the problems, the frustrations will never make the history books. Columbia, soaring once again, did -- the first spaceship ever to return to orbit.

As he surveyed his launch team, Page recalled the power unit problem that stopped the countdown eight days ago, just 31 seconds before liftoff. And the eleventh-hour repair job, completed just after midnight, that made possible a Thursday flight.

"We should have come out of that hold at T-9 minutes right on time," Page said later. "Except, looking around, I was a little concerned that a lot of people were real anxious to go, and I thought it might be good just to take our time and review any problems we might have and give the guys a chance to catch their breaths.

"We'd been pushing pretty hard there," he said. "We had no magic window to make. It took just 10 minutes. It was a beautiful liftoff."

Columbia cleared its launch tower, and the Kennedy Space Center team had done its job. Crews will clean up the pad and await Columbia's return here in about two weeks -- and then ready the ship for Flight III next March. (TODAY, 11-13-81, p. 7A)

<> Some things might be better the second time around, but not for the hundreds of journalists who descended on Kennedy Space Center Thursday morning.

Only eight days had elapsed between the mission's first scrub and Columbia's liftoff, and the normally prolific press was searching for something new to say.

"It's coming up with a fresh story," said Derek Hayward of television station WTVL in Jacksonville, who was also working on a story about the media. "We already came up with a good one a week ago. If it's delayed again..."

Hayward said finding a new angle is even more difficult for a local station because the New York networks cover the Shuttle launch so thoroughly.

Although NASA reported about 2,400 journalists picked up their security badges, the space agency said it had no way of knowing how many actually showed up for the launch. (TODAY, 11-13-81, p. 5A)

<> On October 9 TODAY editorially called upon the Brevard County Commission to give a proper designation to the nameless road that serves as the main approach to the Kennedy Space Center from I-95 in North Brevard.

On November 5, the commission officially designated the five-mile long divided thoroughfare Columbia Boulevard, to permanently commemorate the name of our nation's first Space Shuttle. (TODAY, 11-13-81, p. 14A)

November 14: Although California's Edwards Air Force Base will lay claim to the Columbia today, its undeniable home is Kennedy Space Center.

And the spaceship will be coming back home possibly as soon as Nov. 24 -- giving NASA workers something to celebrate over their Thanksgiving holiday two days later.

The Shuttle Orbiter will be clamped onto a souped-up Boeing 747 and returned so its proud work crews can ready their masterpiece for a possible March 20 third launch.

The third launch, previously scheduled for March 1, has been pushed back to no earlier than March 20 because of the second delay-plagued mission, said NASA orbiter project engineer Gene Thomas.

Bringing the Shuttle up to a launchable level took seven months last time. This time, NASA will have four months based on preliminary scheduling.

The dates are strictly speculative, Thomas added. (TODAY, 11-14-81, p. 3A)

<> A woman barked commands to a manned American spacecraft for the first time Friday, and the astronauts said it sounded "mighty good."

Sally Ride, the first woman to serve as a "cap-com" -- a capsule communicator -- instructed astronauts Joe Engle and Dick Truly from Mission Control as the Shuttle pilots unfolded the ship's robot arm for its first test.

In the first exchange, Truly said, "OK, Sally, we got the arm secured right now. We've got the power on and we're getting ready to turn it on."

Ride: "OK. Sounds good."

Truly: "You sound mighty good too."

Once the arm was successfully deployed, Ride, 30, told Engle and Truly, "OK. That sounds great, and you guys do good work."

Most of the talk was highly technical as the astronauts went through a step-by-step deployment of the $80 million, Canadian-built arm. Ride has a doctorate in physics specializing in astrophysics and has worked extensively with the Remote Manipulator System, the official name of the device.

"She's an astronaut, she's articulate and she's very familiar with the remote manipulator," said NASA spokesman John Lawrence. "We needed someone who had worked with the system and could talk knowledgeably about it."

Ride is a native of Encino, California, and was one of the first six women accepted into the U.S. astronaut corps in 1978. (TODAY, 11-14-81, p. 3A)

<> While the Columbia was experiencing some spacebound problems Friday, the earthbound launch pad at Kennedy Space Center was left virtually unscathed despite the thunderous thrust of the spacecraft's engines.

After a preliminary look at Pad 39A, NASA officials said structural damage was mainly limited to loss of some fire bricks from the flame trench beneath the Orbiter and destruction of a screen on the pad's external tank arm.

Fist-sized yellow-stained chunks of the bricks were thrown more than 500 feet against a barbed wire fence surrounding the pad.

Another fatality was a television camera stationed by NASA on top of the flame trench and demolished by the Columbia's firey takeoff.

"There's very minimal damage; very superficial," said Merle Oakley, lead design engineer for the launch pads.

"The rest is nothing that can't be washed off and painted up," he said. (TODAY, 11-14-81, p. 10A)

November 15: The television set at Kennedy Space Center was just another tourist attraction Saturday.

Clutching dripping ice cream cones, paper bags of NASA paraphernalia and instamatic cameras, about 500 visitors to the space center gathered around televisions to placidly watch the Shuttle Columbia screech to a halt 3,000 miles away in California.

A few seconds of applause and some wondrous "whooos" rang out at the visitors' center, and a few proud smiles shone through. Then the crowd quietly dissipated.

The exuberance so manifest two days earlier when the Columbia's 6.4 million pounds of thrust gracefully pushed the spacecraft skybound just wasn't to be found at the space center Saturday.

But then again, the launch was live, right in front of the tourists' awed faces. Sending a postcard home saying "I was there for the launch," was much more thrilling than mailing one saying "I was at Kennedy Space Center watching the landing on TV." (TODAY, 11-15-81, p. 3A)

<> As Columbia neared its return Saturday, NASA workers were still trying to recover two solid rocket boosters from the Atlantic Ocean off Cape Canaveral, where they have drifted since helping to send the spaceship aloft.

The reusable painted steel canisters were drifting in rough seas about 120 miles from Kennedy Space Center -- about 50 miles closer to shore than the spot where they landed Thursday after peeling away from the Shuttle following the launch.

Recovery divers made "some progress" Saturday as they inserted an air hose called a barb into one of the casings, but they were having difficulty with the second booster. Both must be filled with air so they will float log-like, said Sue Butler, spokeswoman for the manufacturer, United Technologies. (TODAY, 11-15-81, p. 3A)

November 16: Transfer of space shuttle mission control responsibilities from the Johnson Space Center, Houston, to the Kennedy Space Center, Fla., in order to reduce operational costs and make more efficient use of manpower is being discussed with top shuttle managers by Hans M. Mark, deputy administrator of the National Aeronautics and Space Administration.

Mark raised the transfer issue in a NASA internal long-range planning document that was followed by discussion with other headquarters officials.

He characterized the transfer concept as "food for thought" that would stimulate debate.

The document discussed transfer of mission control as early as 1984, but Mark said the actual intent of his comments is to orient the agency thinking toward transfer of mission control to Kennedy if NASA is able to begin operation of large manned platforms or a space operations center in about 10 years.

"No matter how the matter of shuttle operations is finally decided, the Johnson Space Center should phase out of the operational mission during the next three years," according to the advanced planning outline written by Milton Silveira, special assistant to the deputy administrator, and Mark.

"It is very unlikely that it will be possible to control costs of operations if the developmental attitudes that prevail at the Johnson Space Center dominate after space shuttle becomes operational," the outline said. "The operations of the space shuttle, both launch as well as mission control, should be handled by Kennedy Space Center and by Vandenberg AFB, once the West Coast launch facility is complete."

Mark said he believes the transfer of significant Johnson responsibility to Kennedy would become a manpower issue if current manned space station/platform concepts are approved. "This is to start people arguing about the issue. It needs to be discussed in public, and anybody who doesn't want to argue it in public is not participating adequately in the policy discussion," Mark said. (AVIATION WEEK & SPACE TECHNOLOGY, 11-16-81, p. 16, Vol. 115, No. 20)

<> Contamination in the lubricating oil in two of the three auxiliary power units in the orbiter Columbia would not have affected APU operations if the launch had gone as planned November 4, according to two independent laboratory chemical analyses of the oil.

The second space shuttle launch was delayed because it was feared that pressure buildup in the APU oil lubricating system signaled a potential danger that could become acute on reentry by causing a malfuction in APU startup. However, chemical analyses here and in Rockford, Illinois, where Sundstrand manufactures the units, showed that most of the contamination would have returned to solution -- would have melted -- as the units continued to warm for operation.

The basic concern was that the contamination would plug some of the 10 small jet orifices through which oil is sprayed into each of the APU gearboxes. This oil is used both to lubricate and cool the gearboxes in each of the three APU's. (AVIATION WEEK & SPACE TECHNOLOGY, 11-16-81, p. 24, Vol. 115, No. 20)

<> Countdown to launch the orbiter Columbia on its second mission absorbed 2 hours 11 minutes of unplanned holds as the count proceeded. The critical ground launch sequencer measurements that caused the launch to be delayed from November 4 to November 12 performed without anomaly.

The biggest problem that developed in the count was a malfunction of one multiplexer/demultiplexer in the orbiter that is part of the data processing system that relays sensor information from the orbiter to ground stations. (AVIATION WEEK & SPACE TECHNOLOGY, 11-16-81, p. 26, Vol. 115, No. 20)

<> The surprise failure of one of the three electricity-and-water-producing fuel cells on the Space Shuttle Orbiter Columbia soon after launch Thursday was the reason Mi Friday ordered the flight cut to a "minimum mission" of 54 hours, with landing Saturday afternoon at Edwards AFB, California.

Although normally only one or two of the fuel cells are used at any one time on the mission, rules set in advance of the launch require that if one is out, the mission must be cut

to 54 hours from the planned five days-plus. NASA evaluated an extension of the flight Friday before officially announcing the minimum mission decision.

NASA said that the STS-2 fuel cells, all new, are similar to those used on 25 previous manned U.S. space missions and had never failed before. (DEFENSE DAILY, 11-16-81, p. 75, Vol. 119, No. 10)

<> A snapped towline and rough seas hampered the recovery operation but one of Columbia's two solid rocket boosters was pulled into Port Canaveral early Sunday night.

The other booster that helped send the Shuttle into space Thursday remained in the Atlantic Ocean late Sunday but was expected to be towed into port early today.

Once the boosters are towed into port and anchored by the ships, they pass through the port's locks and up the Banana River to the hangars at the Poseidon dock near Cape Canaveral Air Force Station, where they are then pulled out of the water. (TODAY, 11-16-81, p. 10A)

November 17: After four days of bobbing and drifting in an unusually rough Atlantic Ocean, Columbia's second reusable solid rocket booster was brought into Port Canaveral Monday morning.

The two boosters would normally be brought in together but the rough weather held up operations for such a long time that as soon as the first booster was attached to the towline it was hauled in. (TODAY, 11-17-81, p. 8A)

<> With its perfect landing of the Space Shuttle Columbia Saturday, the excellent condition of its insulation tiles and the successful test of the Remote Manipulator System, as well as operation of the OSTA-1 scientific payload, NASA's Space Transportation chief Michael Weeks said Saturday that he considers the mission 90 to 95 percent successful. (DEFENSE DAILY, 11-17-81, p. 83, Vol. 119, No. 11)

<> George Page, NASA's Shuttle launch operations director, says that he believes the minimum turnaround that can be achieved with the Space Shuttle is between 5 and 8 weeks. The Shuttle was designed for a two-week turnaround, but it has become evident that a longer time will be needed. (DEFENSE DAILY, 11-17-81, p. 85, Vol. 119, No. 11)

<> America will have the capability to knock enemy communications satellites out of the sky with a high-powered laser beam by the end of the century, predicts the Air Force general who heads the Shuttle program.

"It would be Buck Rogers style. We're working on that zapping capability now but the laser's pointing and tracking has to be sufficiently mature," said Major General James Abrahamson, who assumed the post as NASA associate administrator for the Shuttle program Monday.

Abrahamson, who will be officially sworn in next Tuesday, replaces L. Michael Weeks. The Washington-based official was interviewed exclusively by TODAY during his visit to Kennedy Space Center last week.

The Defense Advanced Research Projects Agency should decide by January how it will spend about $500 million allocated for high-energy lasers that could defend U.S. satellites or shoot down enemy ones.

He said while the Shuttle itself might not be armed with such a laser, it would probably carry the device partly to its orbit.

Hoisted by the robot arm from the Shuttle's payload bay, a small Air Force rocket would actually launch the laser gun into a higher Earth orbit thousands of miles up.

Abrahamson said he wants to keep Shuttle payload secrets out of the hands of the Russians but that may mean Americans will have less access to what traditionally has been an open space program.

It's a fine line, he said, "but frankly there will be some restrictions on access." (TODAY, 11-17-81, p. 1A)

<> Most excited guy we saw the day the Shuttle launched: ex-NASA bigshot Miles "Mike" Ross. He was deputy director of Kennedy Space Center for seven of his 10 years there.

Mike resigned in 1980 to be European regional manager for TRW International, headquartered in Brussels, Belgium.

"It's the first manned launch I've ever seen from outside," he told us at the fall reunion that night of the Missile, Space and Range Pioneers. "It was just great!"

Mike had always been in the Launch Control Center or other operational area and viewed the launches on TV screens. (TODAY, 11-17-81, p. 1B)

November 20: The library of the future is here at KSC today.

Sure, it has the familiar stacks of books, racks of magazines and newspapers, and our favorite library institutions -- the card catalog and Readers Guide.

But there's something else here that is not so obvious -- the computer.

New computerized information systems recently acquired by the KSC library are putting vast amounts of data at the fingertips of librarians and users. This is in addition to the on-line aerospace technical information system which has been available here for many years.

Bibliographic searches that used to take hours, sometimes days, to complete manually can now be completed in minutes, thanks to the new computer data bases which can be reached from KSC on special terminals.

The KSC library added the two new data bases to its existing ones this summer. The first, called Department of En[illegible]y/ RECON, is an on-line system providing rapid and easy access to energy information stored at the Department of Energy's Technical Information Center in Oak Ridge, Tennessee.

The second new data base is called the Chemical Information System.

It gives the user quick access to basic information about a particular chemical or compound. The information supplied includes things such as molecular structure, other names the chemical is known by, exposure limits, safety, toxicity, disposal methods, transportation and handling procedures. A listing of other sources of information is also displayed.

The Chemical Information System and the DOE/RECON data bases are being used by specialists here at KSC but some organizations which might benefit from the new library services may not be aware they're available, said New World Services' Project Manager Vince Rapetti.

The terminals for accessing the data bases are housed in the documents department across the hall from the library reading room. And if you want to find out more about the capabilities of the system, Bill Cooper, head of the department documents, is the person to see.

There's another data base with far broader applications soon expected to be on-line at KSC. It's Lockheed's DIALOG system and it provides users access to a collection of bibliographic data bases in science, applied science and technology, social science and humanities, and business/ economics.

According to an article in the October issue of the Futurist, such services will be commonplace in the libraries of the future. Already, there are about 70 million bibliographic records readily available on-line and nearly 10 million more are being added each year.

"On-line retrieval can closely approach the desirable ideal of putting the inquirer instantly in touch with a substantial part of mankind's collective memory," wrote two British researchers in a book describing the 189 existing on-line bibliographic data bases. (SPACEPORT NEWS, 11-20-81, p. 3, Vol. 20, No. 23)

<> The orbiter Columbia was not the only piece of Space Shuttle hardware to be reused during STS-2. Some parts of the twin Solid Rocket Boosters (SRBs) had been used before.

None of the parts had flown in space during STS-1, but a surprising number of parts were used during the seven static firings of early motors. Seven such static firings were conducted as part of the development and qualification programs at Thiokol's Wasatch Division in Utah.

The nozzle flex bearing on STS-2's left SRB has, in fact been used three times in the past, during firings of development motors one and three, and on qualification testing motor number one.

In addition, two of the cylindrical case segments on the left booster were previously used on development motor number 4.

The right hand SRB was also made up partially of used parts. Two of its cylindrical case segments and an attach segment were used during the test firing of development motor number four.

The first portions of the SRBs used during STS-1 may be reflown as early as the sixth flight of the Columbia, and other parts will be used in subsequent flights. (SPACEPORT NEWS, 11-20-81, p. 8, Vol. 20, No. 23)

November 21: Delays in purging the Space Shuttle Columbia's maneuvering engine fuel tanks at Edwards Air Force Base, California, has had a minor ripple effect.

The reusable spaceship's two-day trip to Kennedy Space Center, originally scheduled to start Monday, has been pushed back to Wednesday at the earliest.

And the Columbia, riding piggyback atop a 747 aircraft, won't touch down on KSC's Shuttle runway until midday Thursday, said Dick Young, NASA spokesman.

The problem, said Les Rienertsen, NASA spokesman at Edwards, "is the earlier than expected return." (TODAY, 11-21-81, p. 10A)

November 23: RCA's Satcom-IIIR domestic communications satellite was successfully launched at 8:37 PM EST, November 19, from Launch Complex 17 at Kennedy Space Center by a McDonnell Douglas Delta 3910/PAM-D vehicle. (DEFENSE DAILY, 11-23-81, p. 114, Vol. 119, No. 15)

<> Amid the scrubs and holds that punctuated the space shuttle orbiter Columbia's second flight in space -- and the inevitable speculation about its spaceworthiness -- one fact is plain. Columbia's second flight itself was ample demonstration that the concept of a reusable space launch vehicle is technically feasible.

The question raised by the entire process -- the scrubbed launch and the minimum length mission -- is whether four test flights are enough to shake down the shuttle before it goes into operational service. Orbital flight testing for the shuttle was compressed as shuttle costs rose, program delays lengthened and the pressure to show some return for the enormous investment in the reusable launch system became overpowering. Columbia's second flight, though not the cripple it may have been painted in the public eye, does emphasize its research and development phase and the wisdom of thorough seasoning in test. (AVIATION WEEK & SPACE TECHNOLOGY, 11-23-81, p. 11, Vol. 115, No. 21)

<> Approximately 20,175 spectators viewed the second space shuttle launch from National Aeronautics and Space Administration grounds here November 12. Another 10,000-12,000 watched the launch from Cape Canaveral Air Force Station, and estimates of public viewers off government land ranged up to 250,000.

NASA spectators numbered about half those present for the first launch April 12. Approximately 25,000 viewers were at Kennedy November 4 when the launch was scrubbed. Most of the congressional delegation here November 4 opted not to return November 12. The same was true of personalities from stage and screen.

NASA said the presence of the shuttle system here has worked to make this year the highest in attendance at the visitors' center since it was established in 1966. Attendance is up 27% over last year and the total expected to visit before the end of the year is 2 million. (AVIATION WEEK & SPACE TECHNOLOGY, 11-23-81, p. 19, Vol. 115, No. 21)

<> Overpressure and sound suppression modifications made to Launch Complex 39A survived the second space shuttle launch November 12 without damage. A full-scale test of the modified water system was conducted successfully 30 hours after launch.

All reports of pad damage as of the middle of last week indicated it was "a little lighter than on the first launch," according to George W. Warren, National Aeronautics and Space Administration site manager. He added that some local areas were hit more seriously, but in critical areas such as cable tray lids, mobile launch platform and fixed service structure, damage was relatively light.

"A half-dozen missions will go off before most areas on the complex will be tested," Warren said. The damage will affect different areas with each launch.

The overpressure piping that surrounds the solid rocket booster flame holes was an area of concern because it had not been tested with a full-scale system before flight. This piping was designed to cascade water into flame holes to suppress noise and deflect ignition overpressure from solid rocket boosters, which had caused a unexpected pressure spike on the first shuttle launch April 12. The overpressure could be critical because it approached design limits on some shuttle attachment points with a measured value of 2.5 psi. on the first flight. Early data, Warren said, show the spike was reduced to 25% of what was experienced on STS-1.

Water bags, which were placed across the flame holes as a trough, parted and were demolished as expected when struck by pressure from the booster ignition. "The only thing that remained was a little bit of the parachute cord" that secured the bags to the mobile launch platform.

"Shreds of the bags were all over the place," Warren said.

There was some surface erosion on the galvanized water pipes, and ablative material on some mechanical joints of the pipes was blown away.

Solid rocket booster hold-down posts were replaced after the first launch, primarily to assess if there was any structural damage. None was found and, although much of the

ablative material was stripped from surfaces of two of the posts in the second launch, they will not be replaced for STS-3, which is the designation for the third launch.

Warren said no substantial damage resulted to the fixed service structure, although some hand rails were bent on the external tank gaseous oxygen vent arm. A few sections of grating were dislodged on the upper level of the fixed structure, and there was some localized dislocation on the mobile launch platform. For example, the blast protection on a large flexible hose was blown off. It had not been affected on the STS-1 launch. (AVIATION WEEK & SPACE TECHNOLOGY, 11-23-81, pp. 24 & 25, Vol. 115, No. 21)

November 24: NASA Deputy Administrator Hans Mark said yesterday that there is no truth in speculation that NASA is considering closing down Johnson Space Center, although there is a possibility that Space Shuttle mission control could be shifted to Kennedy Space Center in the future.

(One report stated that a study had found that NASA may have to close one of its centers, suggesting Cape Canaveral take over operational control of the Space Shuttle, with Jchnson Space Center officials opting for a new porgram.)

In an interview with Defense Daily, Mark said that Johnson is "one of our best centers" and no consideration is being given to closing it down. He said that NASA is, in fact, looking at turning over the Space Station project to Johnson.

He reaffirmed that the Space Station is the most logical next major porject for NASA, the logical extension of the Space Shuttle effort. (DEFENSE DAILY, 11-24-81, p. 128, Vol. 119, No. 16)

<> Nearly 2,000 space workers told to go home and wait out the budget crisis are expected back on the job today.

NASA officials Monday picked 270 civil servants to stay on the job while placing another 1,864 on furlough without pay until Congress released funds for a return to normal business.

The 270 people were "absolute essential people" needed to monitor contractors paid for space shuttle work through December 1, said KSC Director Dick Smith. (SENTINEL STAR, 11-24-81)

<> Interesting headline November 17 ("Mission control may land here"), and quite apt. If and when Mission Control Center becomes a space station, it might come down at KSC, but that is the only way it will ever reach Florida. Don't forget that a political decision put it where it is and that Texas politicians will keep it there. No less than Vice President George Bush calls it a "national treasure."

A few years ago Don Fuqua, now chairman of the House committee that authorized NASA budgets, asked why astronauts should remain in Texas during the Shuttle era. Just that query touched off a mini-explosion at Johnson Space Center where the boys spent $500,000 to convice the committee it would cost too much to move.

Hans Mark's concern about reducing Shuttle costs carries an obvious implication that NASA knows how much those costs are. Not so at Kennedy Space Center, where no one has ever answered my query: what did it cost to launch STS-1? (TODAY, 11-24-81)

November 25: Kennedy Space Center engineers are analyzing a metal cylinder that fell from the sky over southern Africa in March to learn if it was part of a satellite.

A part of the drum-shaped object, smaller than a human fist, was brought to the U.S. by an American missionary who said the metal piece burned small trees and brush upon impact.

NASA engineers said Tuesday it is most likely a harmless piece of "space junk" -- possibly part of a decayed satellite that disintegrated in the atmosphere.

The Baptist missionary, from Greer, S.C., took the object to the space center Monday. The man, who is on a one-year furlough from Africa, had visited with Rev. Raymond Brendle, pastor of the Grace Baptist Church in Titusville.

The suspected space junk was discovered by native tribesmen who reportedly saw it streak through the sky like a fireball.

He said the man took the object to the space center because he believed it might have been part of the external fuel tank from the Space Shuttle's first mission in April.

But engineers said the metal has a high iron content, leading engineers to believe it's from a satellite, possibly Russian, that began to break up in the upper reaches of the atmosphere.

NASA engineers said the Shuttle tank broke up over the Indian Ocean, east of the African continent.

The intense friction of re-entry would cause most objects to disintegrate in the atmosphere. (TODAY, 11-25-81, p. 10A)

November 26: The space shuttle Columbia completed its piggyback return home Wednesday to the cheers of space workers and their families lining its 3-mile runway.

Tiles intact, the first spaceship to make two trips into orbit and return looked better and arrived back from California three days faster than it did after its first mission in April.

Bolted atop a slim Boeing 747, the stout spaceplane was greeted at the spaceport like a long-lost little brother. Veteran astronaut Deke Slayton, who accompanied the double-decker aircraft in a T-38 chase plane, predicted the third launch would be March 19. It will be from pad 39A, four miles away.

Just after the landing, technicians began work to separate the Columbia from the converted 747, and this was scheduled for completion by 11 p.m. Wednesday.

Work was to proceed around the clock until late morning, when the shuttle is scheduled to be back on the ground for a 2-mile tow to the orbiter processing center, a sort of Space Age garage.

Once inside the garage, the shuttle's payload doors will be braced open and scientific experiments brought back from space will be removed. (SENTINEL STAR, 11-26-81)

November 27: Twice-launched Spacecraft Department: Titusville reader Chick Stucka adds to Harry C. Shoaf's rundown (printed here several weeks ago) on spacecraft that have been launched twice. Harry had been hearing newscasters wrongly say that the Shuttle was the first. He told how a Project Mercury capsule launched from Wallops Island, Virginia, in November 1960 was launched again in March 1961, and that a Mercury-Atlas capsule was launched in April and July 1961.

"Gemini 2 did it twice," Chick said. "The first time was an instrumentation shot in late 1964. We picked it (the spacecraft) up in the Atlantic, brought it back to a Naval Station at San Juan, serviced it there and flew it back to the States.

"The second time, the Air Force used the same spacecraft for MOL (Manned Orbiting Laboratory) in late 1966. It was recovered off Ascension," said Chick, a BCC employee who at the time worked for the spacecraft manufacturer, McDonnell. (TODAY, 11-27-81, p. 1B)

November 30: Martin Marietta Aerospace's Michoud Division now has the first four lightweight external propulsion tanks for the Space Shuttle under construction, with the first to be delivered in September for use on the sixth Space Shuttle mission, which will be conducted in mid-1983.

The lightweight tank will weight 71,000 pounds, 6000 pounds lighter than the External Tank which flew on STS-1. Actually, Martin believes it can reduce the weight by 6400 pounds, but is leaving a 400-pound margin for contingencies.

One of the weight reductions -- eliminating of 600 pounds of white latex paint on the tanks surface -- was made as result of the STS-1 flight which demonstrated that the ET's thermal protection system would adequately protect the tank without the paint.

In addition, Martin now believes it may be able to cut another 1000 pounds from the ET by removing a large slosh baffle from the liquid oxygen tank. Weight savings may also come from eliminating cable trays which run almost the length of the tank (if electrical cabling is routed through the tank's interior), and by substitutuing lighter weight composites for some metal parts. (DEFENSE DAILY, 11-30-81, p. 142, Vol. 119, No. 18)

<> Grumman Aerospace Corp. has announced that it will be competing for the Space Shuttle processing contract that NASA plans to award in the summer of 1983.

The contractor selected will be responsible for refurbishing the Space Shuttle Orbiter between flights -- a job NASA now performs with a number of companies as subcontractors -- along with checkout and assembly of the External Tank and Solid Rocket Booster, and maintenance and operations of turn-around facilities at Kennedy Space Center.

Grumman Aerospace president George Skurla said the company views the Shuttle processing contract "as one of the few major civilian space contracts up for bids in the near future and we're taking a long hard look at it." He said the contract would involve employment of over 5000 people at Kennedy Space Center.

The Grumman effort will be headed by Fred Haise, its vice president for space programs and former NASA astronaut.

Companies interested in bidding on the processing contract have been invited to watch the third flight of the Shuttle next March. (DEFENSE DAILY, 11-30-81, p. 144, Vol. 119, No. 18)

<> To Joe Engle and Richard Truly those dramatic 36 orbits in space must have seemed like a pleasure cruise compared with the postflight grilling they began last week at Houston's Johnson Space Center. Only a day after reaching earth they found themselves at a ceremonial breakfast with Vice President George Bush, who did a little probing of his own to find out what it was like to fly the shuttle (said Truly: "We were just getting the hang of it" when the flight ended). Next day the astronauts started nine days of more formal debriefings, answering the questions af their engineering colleagues, doing a stint in the flight

simulator to check whether it accurately reflects what happens in space, and reporting to the space center's director, Christopher Kraft, Jr. The preliminary verdict: in spite of problems before and during the flight, Columbia was, in that venerable NASA expression, A-OK. (TIME, 11-30-81, p. 72, Vol. 118, No. 22)

<> The space shuttle Columbia's second mission may have been cut short, but scientists are ecstatic about the information gathered by the craft's scientific instruments. Because the shuttle flew much lower than typical satellites, its radar produced sharper and more detailed images than satellites can provide. Analysts can use the shuttle "snapshots" to help uncover mineral deposits that may lie beneath the tangled vegetation of the world's unexplored jungles. And the very first pictures processed turned up a major surprise: they showed large surface waves marching like sand dunes across shallow regions of the Mediterranean Sea. For the moment, that discovery has oceanographers baffled. But it has led scientists to hope that more of the earth's secrets will emerge from the shuttle's readings -- and perhaps some explanations as well. (NEWSWEEK, 11-30-81, p. 29, Vol. XCVIII, No. 22)

December 1: Faced with a possible reduced flight rate for the Space Shuttle Orbiters, NASA has developed a so-called "mixed fleet" launcher concept in which a new unmanned launch vehicle based on recoverable Shuttle Solid Rocket Booster components would be used to augment Shuttle flights when payload space was not immediately available in the Shuttle.

The proposed new unmanned launch vehicle, known as the "SRB-X," would have a payload capability of 65,000 pounds -- the same as the Space Shuttle -- and its Solid Rocket Boosters would be recovered after launch for reuse. (DEFENSE DAILY, 12-1-81, p. 147, Vol. 119, No. 19)

December 2: A cluster of three of the 2.5 million pound thrust Space Shuttle Solid Rocket Boosters combined in an unmanned launch vehicle (SRB-X) could place a 125,000-pound payload into low Earth orbit, according to NASA Deputy Administrator Hans Mark. (DEFENSE DAILY, 12-2-81, p. 156, Vol. 119, No. 20)

<> NASA has concluded that the overpressure on the Space Shuttle during the STS-2 launch last month was about 25 percent of the overpressure experienced on STS-1, which had raised serious concerns about the safety of experiments aboard the Shuttle. A water trough and a water spray system were added to the launch pad for the STS-2 launch, and a NASA spokesman says that the overpressure experienced on STS-1 is considered acceptable, although some permanent launch pad changes will be considered to further reduce the problem. (DEFENSE DAILY, 12-2-81, p. 160, Vol. 119, No. 20)

December 3: The third Intelsat V communications satellite is scheduled for launch by NASA December 9 from Cape Canaveral aboard a General Dynamics Atlas-Centaur launch vehicle. The 4100-pound satellite, built by Ford Aerospace & Communications Corp. using subsystems supplied by an international team, will provide 12,000 simultaneous two-way voice circuits and two color television channels. The spacecraft will be placed in an elliptical transfer orbit ranging from 103 to 22,347 miles, where its apogee kick

motor will fire to circularize the orbit at geosynchronous altitude over the equator at 15 degrees east longitude. The first two Intelsat V spacecraft were successfully launched by Kennedy Space Center on December 6, 1980, and May 23, 1981, respectively. A total of nine Intelsat V's are planned. (DEFENSE DAILY, 12-3-81, p. 163, Vol. 119, No. 21)

<> ...Using a flying "helitorch" to start a controlled burn of about 4,000 acres near the (three-mile-long Space Shuttle) runway, NASA officials hope to eliminate the (tree) swallows' food source and vegetation. With no place to live the birds should congregate farther away from the landing strip, government officials said.

NASA will be aided by the U.S. Fish and Wildlife Service, National Park Service and the Bureau of Land Management.

The burn should last no more than a few hours and is set to begin at 9 a.m., said Dorn Whitmore, spokesman for the U.S. Fish and Wildlife Service.

Whitmore said the burn is accomplished from a helicopter that carefully and precisely drops small amounts of igniting fluid on the shrubs below.

Whitmore said some wildlife will fall victim to the burn. "I'm sure some wildlife will be killed. Certain species will be trapped and killed," he said.

While the swallows don't create a problem for the gliderlike Shuttle, they can get lodged in the engines of aircraft. (TODAY, 12-3-81)

December 6: Trailing a sonic boom from Clearwater to Cocoa, the space shuttle Columbia will thunder to its first Florida landing at Kennedy Space Center sometime next summer.

During four scheduled flights in 1982, the shuttle will deploy three satellites in orbit. A second spaceship, the Challenger, will also join the shuttle fleet and fly its first mission late in the year.

A total of 80 launches, including expendable rockets, missiles and shuttle flights, are planned for Florida by NASA and the Air Force in 1982. The unofficial count, published in AVIATION WEEK, includes 50 Poseidon and Trident ballistic missiles to be test-fired from U.S. and British submarines, and nine non-military satellite launches aboard expendable Delta and Atlas-Centaur rockets.

There were only 50 major launches at Cape Canaveral this year, including the shuttle's first two test flights.

The shuttle is scheduled to return to space no earlier than March 19, with Marine Col. Jack Lousma and Air Force Col. Gordon Fullerton at the controls for an ambitious seven-day mission.

"The ship came back in super condition, in better shape than after the first mission," said Jim Harrington, chief of shuttle orbiter operations at Kennedy Space Center. "I've heard nothing that would alter plans for a full seven-day mission. (SENTINEL STAR, 12-6-81, p. 1-A)

December 8: President Reagan yesterday at the White House presented the Distinguished Service Medal, NASA's highest honor, to the astronauts who piloted the second Space Shuttle mission last month, Col. Joe Engle (USAF) and Capt. Dick Truly (USN). The astronauts presented the President with a silver medal commemorating the second flight of the Space Shuttle Columbia, an American flag carried on the flight, photographs of the mission, and a NASA crew patch designed for the mission. The President told the astronauts that he was "thrilled" by their flight and that he is "very proud" to accept the mission mementoes. The President noted that he was particularly amazed by one aspect of the Shuttle mission: that it takes only 20 minutes to get over from Hawaii to landing at Edwards AFB in California. (DEFENSE DAILY, 12-8-81, p. 187, Vol. 119, No. 24)

<> Snuggled in a steel cocoon of electronic gadgetry, the space shuttle Columbia is ahead of schedule for a third flight the week of March 22, space officials said Monday.

"I think we've got a good shot at the latter part of March. We're pressing on with it. In fact, we're a little ahead of the game," said Jim Harrington, shuttle ground operations manager.

Harrington said a faulty fuel cell blamed for cutting short last month's mission will be replaced by next week, and that modifications for the next flight include an extra set of fuel tanks to sustain the orbiter through seven days in space.

The shuttle team now hopes to cut the previous 15 1/2 weeks of postflight maintenance nearly in half, Harrington said.

That would allow the Columbia to be moved to the nearby Vehicle Assembly Building in February for linkup with a new fuel tank and two solid rocket boosters.

The quicker flight preparation is possible mainly because fewer tests have been scheduled, Harrington said.

"The more and more you fly it, the more you learn and the more confidence you derive," he said.

Tests are being conducted only on things that have been modified, failed in flight or needed to be replaced -- such as the faulty fuel cell.

Since November 29, workers have removed 70 tiles and marked more than 100 others having nicks or other minor problems with a tiny shuttle insignia and they will be repaired in place, Harrington said.

No tiles fell off during the second flight -- unlike the first mission -- and only 12 of those removed will actually have to be replaced, he said. (SENTINEL STAR, 12-8-81)

December 9: The fight to save Playalinda Beach is on.

Members of the Save Our Beach citizens group put their protest plans on hold Tuesday long enough to hear what Canaveral National Seashore Superintendent Don Guiton had to say to the Titusville City Council about a proposed 10-year seashore management plan.

When Guiton couldn't promise that North Brevard's only beach would be open more than half the time after NASA opens Launch Pad 39 B in 1986, S.O.B. decided to take action.

The protest group now plans to begin a signature drive to convince the park service not to adopt the 103-page management plan.

At the center of the controversy is the long-dormant launch pad that by 1986 is expected to hurl space shuttles into orbit. It is only about a mile from SR 402, the only beach access, and both sides acknowledge that creates a security problem. (TODAY, 12-9-81, p. 3B)

December 10: Disclosing that NASA has not reduced its Shuttle flight rate in order to meet budget cutbacks, NASA Associate Administrator Dr. Stanley Weiss said yesterday that NASA is still planning to conduct 32 Space Shuttle missions through fiscal 1985, basically the same as planned six months ago. In fact, 34 flights through FY '85 were planned at that time, but since then the availability of the Vandenberg launch site has slipped 14 months, eliminating three of those flights, one of which has been shifted to Kennedy. (DEFENSE DAILY, 12-10-81, p. 204, Vol. 119, No. 26)

<> RCA Americom's Satcom III-R (replacement), launched November 19 from Cape Canaveral, has been placed in its assigned synchronous orbital position at 131 degrees west longitude. When fully operational early next year, the satellite will carry cable television programming currently carried on Satcom 1. (DEFENSE DAILY, 12-10-81, p. 207, Vol. 119, No. 26)

<> The OSTA-1 package of seven scientific experiments carried on the second Space Shuttle mission gathered almost all the Earth-observation data that was sought despite the fact that the mission duration was cut from 5 to 3 days, according to OSTA-1 chief Dr. James Taranik.

A key objective of the $11.6 million OSTA-1 was to evaluate the ability of the Shuttle Orbiter to serve as a steady platform for Earth-viewing instruments.

Taranik said the STS flight was a success scientifically.

The agency reported that the experimental side-looking radar flown on the mission obtained eight hours of radar pictures and worked "perfectly," meeting all of its objectives. NASA said the radar's ability to penetrate clouds and vegetation makes it "extremely attractive" for mineral resource exploration.

The one experiment that failed was an attempt to photograph lightning storms. Although such storms were spotted, the limited amount of data obtained was of low quality. (DEFENSE DAILY, 12-10-81, p. 206, Vol. 119, No. 26)

December 11: Cosmic dust, solar flares and the effects of weightlessness on plant growth are some of the mysteries that will be explored during the shuttle's third flight in March, NASA scientists said Thursday.

The seven-day itinerary also includes the first lifting chores for Columbia's 50-foot mechanical arm, which was tested successfully last month during maneuvering exercises on the abbreviated shuttle flight.

Scientists also plan to study reactions of the orbiter and payload to temperatures greater than those experienced on Earth; the effects of an orbiter-generated "cloud" of particles and gases, if any exists, and the degIte of electrical charging on the $10 billion spaceship.

Astronauts Jack Lousma and Charles Fullerton are expected to fly the shuttle in various new altitudes to determine the effect of intense heat and cold on the orbiter as it flies into and away from the sun, said Kenneth Kissin, mission manager from NASA's Goddard Space Flight Center in Greenbelt, Maryland.

"It's important for us to know if the payload bay doors will open and close in those conditions," Kissin said.

To test the orbiter's thermal capacities, Columbia will be piloted into a "barbecue roll" so that it will be spinning much like an electric rotisserie as it hurtles through space.

The plant growth test, the shuttle's second plant experiment, will allow scientists to observe the effect of weightlessness on lignin, the substance that makes plants stand upright. Four seedlings -- peas, oats, cucumber and pine -- will be stowed in a locker in the crew cabin shortly before takeoff.

The plant test on the last shuttle flight, another zero-gravity experiment, was inconclusive because the mission was shortened from five days to two due to a fuel cell failure.

Kissin characterized experiments to be conducted on the third flight as much more sophisticated and "scientific" than on previous missions.

One test, the Vehicle Charging and Potential experiment, includes the first fast-pulse electron gun to be used in space. The low-powered gun will emit electron charges from the shuttle to change the electronic potential around the ship. This experiment is expected to help spacecraft engineers determine the charging properties of the orbiter and assess electrical changes associated with the experiments.

A sun-oriented experiment will study polarization of X-rays emitted during solar flares.

The Canadian-built robot arm, the star of the second mission, is scheduled to be operated on three different occasions during the flight. (SENTINEL STAR, 12-11-81)

<> NASA has revived its plan to retrieve and repair the orbiting Solar Maximum Mission spacecraft via a Space Shuttle flight in 1983. The SMM retrieval mission is planned as the first extravehicular activity (EVA) on the Shuttle. To simplify the astronauts' task in going to EVA, the agency is giving serious consideration to development of a high pressure space suit. (DEFENSE DAILY, 12-11-81, p. 212, Vol. 119, No. 27)

<> NASA has received bookings from foreign and commercial customers for 109 payloads to be launched by NASA launch vehicles, of which 61 are for the Space Shuttle. Some orders extend into the late 1980's. Six months ago NASA had

booked 28 payloads on the Shuttle (Defense Daily, June 4). Some payloads are double booked on the Shuttle and an Expendable Launch Vehicle. The Shuttle can carry 3 Delta class payloads (e.g., satcoms) per mission.

NASA Payload Bookings

Total	Expendable LV's	Space Shuttle	Double Booked
		Domestic	
59	26	26	7
		Foreign	
50	8	35	7
		Total	
109	34	61	14

(DEFENSE DAILY, 12-11-81, p. 212, Vol. 119, No. 27)

<> The following is a summary of operational Space Shuttle launches planned through FY '87. The four Shuttle development [one in FY '81 and three in FY '82] flights are not included. NASA proposes to maintain the Shuttle launch schedule at 24 launches a year beginning in FY '88.

	FY'82	FY'83	FY'84	FY'85	FY'86	FY'87
			Kennedy Space Center			
NASA other U.S. Gov.	-	4	4	5	5	7
DOD	-	-	2	4	5	5
Foreign	-	1	1	1	2	3
U.S. Commercial	1	-	2	3	3	2
Total KSC	1	5	9	13	15	17
			Vandenberg AFB			
NASA	-	-	-	-	1	-
DOD	-	-	-	-	1	6
Total VAFB	0	0	0	0	2	6
Grand Total	1	5	9	13	17	23

(DEFENSE DAILY, 12-11-81, p. 212, Vol. 119, No. 27)

December 12: Wrapped in silver foil like enormous Christmas presents, Europe's Spacelab arrived at Kennedy Space Center Friday aboard a plane that would dwarf three jumbo jets.

Like many Christmas presents, Spacelab came unassembled. And before the four boxes were unloaded from the U.S. Air Force C-5 transport, engineers from both sides of the Atlantic were predicting they would have the barrel-like lab ready for its first flight deep inside the Space Shuttle's cargo bay by late 1983.

Spacelab is designed to be a home for as many as four people who will study the Earth and the surrounding cosmos from space.

Landing at KSC's three-mile-long Shuttle runway after an 11-hour flight from Hanover, West Germany, the Air Force transport dramatically lifted its front nose cone exposing the cavernous innards and more than 20 tons of cargo.

"It looks good for '83. We had a lot of soul searching meetings (at NASA and European Space Agency centers)," said John Neilon, who heads Spacelab processing for NASA.

Neilon said after a day's work unloading what is most of the 23-foot-long laboratory, "it should be assembled and looking like something by the first week in February."

A second shipment of Spacelab parts is expected within 10 days.

The biggest hurdle to assembling the $900 million lab may be a cultural barrier.

Built by 10 European nations but assembled by Americans, Spacelab was born out of an international melting pot of space technology.

"There always is some difficulty in the translating. It's something we'll all be working on," said Richard Smith, space center director.

Just how successful the European venture in space is will depend on economic factors.

Europe's inflation and unemployment woes could put a dent not only in future Spacelab development, it could affect work on the continent's other space venture -- the Ariane satellite launcher. (TODAY, 12-12-81, p. 12A)

December 13: The Space Shuttle's barrel-shaped 12-story-high fuel tanks -- which are destroyed in the atmosphere after each launch -- may be recycled as a spaceship for colonists to Mars in the next century.

While a voyage to the red planet is still speculation, NASA scientists have decided to take one of the 76,000-pound fuel tanks on a day's ride around the Earth in 1983 to see how well it withstands the rigors of getting into space.

Engineers are considering the short-and long-term uses of the tank, which fuels Shuttle main engines in launch. The engineers are proposing the $10 million tank be saved after every flight.

The external tank isn't the only Space Shuttle component that may get a life after death.

The two-solid-fuel booster rockets, which give the Shuttle its initial fiery kick into space, are reusable but engineers would like to send them up as unmanned satellite launch vehicles after they have served the Shuttle.

Under a $250,000, one-year contract, Boeing Aerospace Co. engineers are studying the potential of the SRB-X -- a rocket that would offer a cheap alternative and backup to the Shuttle for launching military and commercial satellites.

"The thinking is toward a mixed fleet of expendable rockets and the Shuttle," said Bob Marshall, who heads a NASA team studying the idea at Marshall Space Flight Center in Huntsville, Alabama.

He said a single 119-foot booster rocket -- or more for added thrust -- would be a uniform vehicle that would replace Atlas Centaur and Delta rockets now used.

"That would eventually cut costs," Marshall predicted. "One assembly line could take care of all space vehicles."

He said the first refurbished booster rockets could be ready for launch by 1990 from Kennedy Space Center. (TODAY, 12-13-81, pp. 1A & 20A)

December 14: Modifications to the space shuttle orbiter Columbia progressed last week as engineers and technicians maintained a turnaround schedule designed to prepare the orbiter for its third flight in late March.

The STS-3 solid rocket boosters and external tank also are undergoing final preparations for mating in the Vehicle Assembly Building, and the two elements are scheduled to be joined shortly after January 1, 1982.

Modifications to the orbiter are:

*Replacement of the fuel cell that caused the duration of STS-2 to be reduced to 54 hours. Another set of fuel cell propellant tanks will be installed to extend the life of the system that generates water and power. STS-3 is scheduled to last seven days.

*Replacement of a malfunctioning auxiliary power unit.

*Changing the microwave scanning beam landing system, which was a planned removal and replacement.

*Changing radar altimeters in the forward section of the cabin, also a planned maintenance activity. (AVIATION WEEK & SPACE TECHNOLOGY, 12-14-81, pp. 18-19, Vol. 115, No. 24)

December 15: In a change of plans, NASA has decided to fly four astronauts on the first operational Space Shuttle mission (the fifth shuttle flight) scheduled for November 1982 on the revised Space Shuttle manifest.

The third Space Shuttle flight is scheduled for mid-to-late March and the fourth and last Shuttle R & D flight for July.

The original plan was to fly the Space Shuttle Columbia with two astronauts until its two ejection seats were removed after flight five. However, NASA now plans to simply deactivate two ejection seats behind the two cockpit seats and on the upper level of the cabin and one in the lower level.

The four-man STS-5 mission is to fly in space for five days, launching the SBS-C and Telesat-E communications satellites.

The second Shuttle Orbiter, Challenger, is not equipped with ejection seats and will have room for a crew of seven. It will carry four men on its first flight, STS-6, which is scheduled for January 1983 from Cape Canaveral. Challenger is to be delivered to Kennedy Space Center from Rockwell's Palmdale, California, plant next June. (DEFENSE DAILY, 12-15-81, p. 231, Vol. 119, No. 29)

<> Dr. Frederick G. Pierce, a former deputy medical director at Kennedy Space Center, died Sunday in Homosassa Springs after a heart attack. He was 59.

Pierce worked at KSC from 1970 to 1974 before opening private general practice in Cocoa Beach for two years.

In addition to his daughter, survivors include his wife, Mary Pierce of Homosassa Springs, and two other children, John Pierce of Beaumont, Texas, and Barbara Haylock of Sparta, N. J. (TODAY, 12-15-81, p. 3B)

December 16: The third in a series of Intelsat V commercial communication satellites roared into space Tuesday night after a four-day delay caused by mechanical problems with the Atlas-Centaur booster rocket.

The satellite is owned and operated by the International Telecommunications Satellite Organization, which already has 14 communication satellites in space. Tuesday's launch went as scheduled at 6:35 p.m.

The Intelsat system handles two-thirds of the world's overseas communications as well as domestic communications for 14 countries. Twelve more Intelsat V satellites will be launched.

Tuesday's mission cost $75 million. The 4,110-pound satellite can relay 12,000 telephone calls and two color television channels at one time.

A spacecraft motor will be fired in a week to place the satellite in a stationary orbit 22,300 miles above the equator.

A decision will be made later as to whether the satellite will be used over the Atlantic or Indian oceans, company officials said.

Technicians postponed a Friday launch to check oil pressure in the rocket engines and a mission-destruct mechanism required if the launch went off course. Another delay announced Sunday allowed workers to replace a stabilizing system used to counteract winds and keep the rocket on course during launch. (SENTINEL STAR, 12-16-81)

December 17: The non-rocket components of the first Inertial Upper Stage, to be launched this summer atop the Air Force's Titan 34D launch vehicle, has been shipped to the Air Force Eastern Launch Site, Florida, by Boeing Aerospace. The two IUS solid fuel rocket motors, being built by United Technologies Chemical Systems Division, will be shipped to Florida this month and in February, respectively. The Boeing hardware is comprised of the IUS equipment support section, which houses systems for guidance and navigation, telemetry, electrical power, tracking and command, and the IUS Interstage, which will connect the two rocket engines. Boeing says that redundancy and parts quality give the IUS an estimated reliability of 98 percent. The IUS is slated to make its first launch on the Space Shuttle in January 1983. (DEFENSE DAILY, 12-17-81, p. 244, Vol. 119, No. 31)

December 18: NASA's Kennedy Space Center is issuing RFPs for provision of a "turnkey" Shuttle Inventory Management System (SIMS II), a logistics management system which will control material to support the operation of the Space Shuttle. This will include spare parts for ground support equipment, flight hardware and institutional support requirements. The system will support NASA Shuttle management, Air Force Shuttle project management at Vandenberg AFB, development center Shuttle logistics office at Johnson Space Center and Marshall Space Flight Center, contractors at KSC, Vandenberg, Marshall, MAF and Downey, and logistics

personnel at KSC and Vandenberg. The Kennedy Center points out that the "magnitude" of the procurement "will tend to render some otherwise qualified firms incapable" of performing the contract. (DEFENSE DAILY, 12-18-81, p. 250, Vol. 119, No. 32)

December 19: The Space Shuttle Columbia could be America's loudest firecracker next Fourth of July.

The fourth mission of the reusable spacecraft is scheduled for the beginning of July and Kennedy Space Center Director Dick Smith said he'll aim for a launch on America's 206th birthday.

"I went to George Page (Shuttle launch director) and said why don't we really try to push it to the Fourth. I think it would be great," Smith said Friday.

Would a fourth of July Shuttle launch attract the big brass from Washington? Smith, 52, hopes so but he added security concerns in light of revelations of a Libyan assassination squad may restrict presidential travel next year.

He cited the president's recent decision to light the White House Christmas tree from inside, bowing to security precautions.

The fourth Shuttle mission also will be a first as engineers plan to land the spacecraft at the 3-mile-long KSC runway.

NASA wants to test the Shuttle's ability to handle in runway crosswinds at Edwards Air Force Base in California during the third mission before venturing a KSC landing.

No firm date on the third Shuttle mission has been set but Smith said NASA is still looking toward a mid-March flight with astronauts Jack Lousma and Charles Fullerton. (TODAY, 12-19-81, p. 16A)

December 21: Contractor and government workers will take an 11-day vacation from work on the space shuttle system December 23 until January 4, 1982, as most of the modifications have been completed for the next launch of the shuttle, which remains on schedule for late March. The orbiter Columbia will be moved from the orbiter processing facility to the Vehicle Assembly Building.

A total of 70 modifications were scheduled on Columbia after its second flight, and as of late last week, all but 14 were accomplished. One activity last week was the shipment of the orbiter tires to the Rockwell International facility in Downey, California, for a cold soak to verify they will survive in the 200 C environment to which they will be exposed on the third mission.

Also accomplished last week was a flush and oil change of the No. 2 and No. 3 auxiliary power units. The No. 1 unit has been replaced, and it will undergo a functional test this week.

National Aeronautics and Space Administration last week said 378 thermal protection system tiles have been removed from the orbiter, most of them for densification. Of these, 104 have been replaced.

Most of the modifications were accomplished while the orbiter was powered down December 4-16. The primary STS-3 payload -- the NASA Office of Space Sciences experiment package -- is scheduled to be installed in the orbiter cargo bay January 10. (AVIATION WEEK & SPACE TECHNOLOGY, 12-21-81, p. 14, Vol. 115, No. 25)

December 22: The leak of 15 to 20 gallons of nitrogen tetroxide oxidizer being pumped into the Shuttle Columbia September 22 was caused by a design problem in the ground quick disconnect fittings.

NASA has returned the 42 disconnect fittings to Fairchild Stratos, where design modifications will be considered.

The committee investigating the accident has reported that the failure of the quick disconnect fittings was due to an accumulation of iron nitrate in the oxidizer which lodged between the interior components of the fitting, allowing an open path for the oxidizer to spill out.

The report said that the close tolerance of the interior components allowed the contaminant buildup to create the spill.

"The design of the fitting provided a single failure point which had not been recognized prior to the incident," it reported.

The committee recommended a series of protective measures to guard against a similar failure in the future, including elimination of the use of the quick disconnect as a flow shut-off valve and use of protective aprons. (DEFENSE DAILY, 12-22-81, p. 269, Vol. 119, No. 34)

December 23: The failure of fuel cell #1 on the Space Shuttle Columbia during its second flight last month, which led NASA to cut the flight from 5 to 2 days, was caused by corrosion in the fuel cell -- a problem that NASA had not expected to find.

Engineers dismantling the faulty cell Monday at United Technologies Corp. in Windsor Locks, Connecticut, found that aluminum hydroxide had clogged two of the three aspirators that remove water from the fuel cell, and that the third aspirator had a hole in its nozzle. NASA said the source of the aluminum hydroxide, which is caused by the corrosion of aluminum, is not known.

As a result of Monday's finding, NASA has removed the three fuel cells now aboard the Columbia to see if they have a similar corrosion problem. If they do, the third flight of the Shuttle, scheduled for the week of March 22, could be delayed.

Work on the Columbia at Kennedy Space Center is to be halted between Christmas and New Years day to give contractor personnel a vacation.

Astronauts Jack Lousma and Gordon Fullerton are scheduled to fly the third Shuttle flight, which is scheduled for seven days. (DEFENSE DAILY, 12-23-81, p. 275, Vol. 119, No. 35)

<> Two successful flights of the Space Shuttle Columbia, Voyager 2's flyby of Saturn and a perfect launch record were among the highlights of 1981 for the National Aeronautics and Space Administration.

Columbia's two missions, in April and November, marked a new era in space flight. It was the first time that a spacecraft has been launched from and returned to Earth and then reused for a second mission.

More spectacular photographs and new detail and scientific data resulted from the closest approach to the giant ringed planet of Saturn by NASA's Voyager 2 spacecraft late in August.

The Voyager 2 mission added to information already gained about Saturn from Voyager 1 which flew past the planet in November 1980. Voyager 1 is moving out of the ecliptic plane of the solar system while Voyager 2 will travel several billion more miles to a Uranus encounter in January 1986, then on to a rendezvous with Neptune in August 1989.

In addition to the two Shuttle missions, there were 11 other successful launches by the agency. The year's perfect launch record is the fifth in the agency's 23-year history. The launches ranged from weather and communications satellites to environmental monitoring and Sun-Earth energy studies.

Space Transportation System

1981 was the year of the Shuttle. Two successful missions were conducted, in April and November, as the flight testing of the Space Shuttle, a key element in NASA's Space Transportation System, reached its halfway mark.

Astronauts John Young and Robert Crippen flew the Orbiter Columbia during its historic 54 1/2-hour initial mission. The second flight, STS-2, carrying the first payload and the remote manipulator arm was manned by astronauts Joe Engle and Richard Truly.

The new era in manned space flight began April 12 at 8:00 a.m. EST, when the Space Shuttle roared off the launch pad at the Kennedy Space Center, Florida. The two-million-kilogram (four-and-a-half-million-pound) revolutionary

spacecraft was thrust into space by a combination of two solid rocket boosters and a trio of liquid fuel Space Shuttle main engines.

Young and Crippen, during their two days in orbit, carried out a wide ranging series of systems checks to prove the feasibility of the Space Shuttle system.

During the flight, television cameras detected minor damage to the Thermal Protection System (TPS) tiles located on the Orbital Maneuvering System pods. The damage was not deemed serious.

At 10:21 a.m. PST, on April 14, the Columbia landed safely on Rogers Dry Lake at Edwards Air Force Base, California. The first Space Shuttle mission was determined to be an unqualified success.

The Columbia was returned to the Kennedy Space Center in a less spectacular way -- piggybacked atop its 747 carrier aircraft.

STS-2, launched November 12 from Kennedy Space Center, was significant in that it was the first time a spacecraft had been reused. Columbia, piloted by astronauts Joe Engle and Richard Truly, carried a space applications payload and a remote manipulator arm. It landed at Edwards on November 14.

Despite a shortened mission, caused by a failed fuel cell, STS-2 was a success. Over 90 percent of the test objectives were completed by Engle and Truly and data from the OSTA-1 experiment package delighted investigators.

The Remote Manipulator System worked well and the Thermal Protection System again proved itself effective during the fiery entry through the Earth's atmosphere.

An investigation into the fuel cell failure began shortly after the orbiter was ferried back to the Kennedy Space Center from NASA's Dryden Flight Research Facility at Edwards.

Within two weeks after landing, work began on readying the Columbia for its third flight test scheduled for March 1982.

Meanwhile, construction continued on the second orbiter, Challenger, at Rockwell International's plant at Palmdale, California. The newest orbiter is to be delivered to the Kennedy Space Center in mid-1982.

As orbiter construction proceeded, main engine testing continued at full power level (109 percent of rated power level) and external tank production maintained a steady pace.

As the Space Shuttle began to prove itself, a new study began on an unmanned launch vehicle based on solid rocket booster technology. SRB-X would be capable of boosting a 29,490-kg (65,000-lb.) payload into low Earth orbit or 5,443 kg (12,000-lb.) in geosynchronous orbit. (NASA NEWS RELEASE NO. 81-199, 12-23-81)

<> NASA planners have set their sights on an ambitious launch schedule for the coming year: 10 expendable vehicle launches and three Space Shuttle flights, including the first operational mission.

Of the 10 expendable vehicles, seven will be Delta rockets and three will be Atlas Centaurs. One of the Deltas will be launched from KSC facilities at Vandenberg AFB, California, and will carry the only non-communications satellite to be launched this year.

The launch scorecard for 1982 begins in mid-January with RCA-C1, aboard a Delta. February will see another Delta, this one boosting a WESTAR-IV into orbit.

March will be a busy month, beginning with an Atlas Centaur rocket with an INTELSAT V-F-4 satellite for the 106-nation International Telecommunications Organization, and perhaps ending with the launch of the third Space Shuttle mission (STS-3) with its OSS-1 astronomical investigations package on a seven-day flight.

April and May will have a Delta and its INSAT-1A payload and an Atlas Centaur with its INTELSAT V F-5. There are no launches currently listed for June.

July will again have two launches, an earth resources satellite, LANDSAT-D aboard a Delta from Vandenberg AFB, and the fourth Space Shuttle mission (STS-4) from KSC carrying a Department of Defense payload. The action then continues in early August with a Delta rocket and its TELESAT-F payload, also called ANIK-D, a Canadian communications satellite.

Launch teams get what would be a three month break at this point, were it not for a Delta launch in late September. The payload for that launch is WESTAR-V. November will see the fourth Delta in a row, with RCA-E as its payload, and will be highlighted by STS-5, the first operational mission of the Space Shuttle. That flight is listed as carrying two communications satellites, SBS-C and TELESAT-E and their boost stages plus an experiments pallet, OSTA-2. The mission is scheduled to last five days.

The last launch of 1982 is now listed as being an Atlas Centaur, carrying INTELSAT V F-5A, the third Atlas Centaur and INTELSAT combination for the year.

The WESTARS are being launched for Western Union, the RCA satellites are part of the RCA Satcom Network, the SBS series is owned and operated by Satellite Business Systems, the TELESATS are being orbited for Telesat Canada and the INSAT will be launched for India.

The communications satellites missions are classed as reimbursables, meaning that NASA will be reimbursed for the cost of the launch vehicles and launch operations. Communications satellites are placed in stationary orbits at selected points 35,600 kilometers (22,250) miles above the equator. Their orbital speed is synchronized with that of the Earth's rotation and they appear to hang or hover over their assigned duty stations. (KSC RELEASE NO. 321-81, 12-23-81)

December 24: Kennedy Space Center workers exposed to asbestos fibers at a major warehouse haven't complained of discomfort, and cleanup crews plan to spend the holidays mopping up the layer of dust caused by the fallout.

"It was not enough asbestos and they weren't exposed to it long enough for there to be any health hazard," said Dr. Paul Buchanan, a space center physician.

About 40 of the 250 workers at the central supply warehouse are getting physical exams scheduled through the first of the year, Buchanan said.

Those people were exposed briefly to the irritating substance during renovation work to plumbing. As workers sawed the old fixtures, dust with particles of asbestos fell to the floor. As much as an inch of the stuff coated the floor.

"These (the physical exams) are simply to establish a base line, to be cautious. We would be extremely surprised if anybody developed any problems because of this exposure," Buchanan said. (TODAY, 12-24-81, p. 1B)

December 25: Ahead of schedule, the space agency played Santa Claus to the several thousand men and women preparing the Shuttle Columbia for its third flight into Earth orbit.

Since Wednesday and through January 4, Shuttle workers will have a holiday. Meanwhile, the object of their dedication, the Columbia, is being refurbished at a smoother pace than during the weeks between the first and second flights.

"We're ahead of schedule and we're not pushing people like we did in the past. It was taxing to them and their families," said Dick Smith, Space Center director. (TODAY, 12-25-81, p. 20A)

Appendix A

1981 NASA LAUNCH RECORD

Date	Payload	Launch Vehicle	Launch Site	Mission Remarks
February 21	COMSTAR-D	Atlas Centaur	ESMC*	Comsat General Corp. communications.
April 12	Space Shuttle	STS-1	KSC**	First Space Shuttle flight.
May 15	Navy 20 (NOVA 1)	Scout	WSMC***	DOD transit.
May 22	GOES-E	Delta	ESMC	NOAA weather.
May 23	Intelsat V-B	Atlas Centaur	ESMC	Intelsat communications.
June 23	NOAA-C	Atlas-F	WSMC	NOAA weather.
August 3	Dynamics Explorer	Delta	WSMC	NASA scientific.
August 6	FLTSATCOM-E	Atlas Centaur	ESMC	DOD communications.
September 24	SBS-B	Delta	ESMC	SBS communications.
October 6	Solar Mesosphere Explorer	Delta	WSMC	NASA scientific.
November 12	Space Shuttle	STS-2	KSC	Second Shuttle flight. First reuse of a spacecraft.
November 19	RCA-D	Delta	ESMC	RCA communications.
December 15	Intelsat V-C	Atlas Centaur	ESMC	Intelsat communications.

*ESMC - Eastern Space and Missile Center, Cape Canaveral, Fla.
**KSC - Kennedy Space Center, Fla.
***WSMC - Western Space and Missile Center, Vandenberg Air Force Base, Calif.
(NASA NEWS RELEASE NO. 81-199, 12-23-81)